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DARK-SPORED AGARICS—V

PSILOCYBE

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Atylospora and *Psathyrella*, discussed in the last article in this series, are characterized by a slender, cartilaginous stipe, adnate or adnexed lamellae, and a straight, appressed margin. The genus here treated differs from them in having the margin of the pileus incurved at first.

PSILOCYBE (Fries) Quél. Champ. Jura Vosg. 116. 1872

Agaricus § *Psilocybe* Fries, Syst. Myc. 1: 289. 1821.

This difficult genus differs from *Atylospora* in having the margin of the pileus incurved when young, and from *Campanularius* in having purplish-brown instead of black spores. See *Mycologia* for January, 1918, where four species occurring in tropical America are described. None of our temperate species seem to grow in tropical regions.

Pileus about 0.5-1 cm. broad.

Surface reddish-brown, becoming alutaceous on drying.

Surface dull-brownish, then pallid with yellowish spots.

Pileus about 1-2.5 cm. broad.

Stipe 1-2.5 cm. long.

Surface pallid.

Surface brown or yellowish-brown.

Plants gregarious or solitary on dead wood.

Plants densely caespitose on manure and compost.

1. *P. phyllogena*.

2. *P. submaculata*.

3. *P. limophila*.

4. *P. camptopoda*.

5. *P. caespitosa*.

[MYCOLOGIA for November (14: 297-350) was issued November 13, 1922.]

- Stipe 2.5-5 cm. long.
 Pileus yellow; stipe pallid or yellowish.
 Pileus dark-ochraceous; stipe reddish-brown.
 Pileus whitish with reddish-yellow center,
 then darker or brown; stipe white.
 Pileus grayish or ochraceous-brown, pubes-
 cent when young; stipe whitish.
 Pileus dark-brown or reddish-brown when
 moist, often paler on drying.
 Stipe white or whitish.
 Stipe 1.5-2 mm. thick.
 Stipe 3 mm. thick.
 Stipe bluish.
 Stipe brown or reddish-brown.
 Stipe 1-2 mm. thick.
 Spores $7 \times 5.5 \mu$.
 Spores $8-10 \times 4-5 \mu$.
 Spores $10-13 \times 6-8 \mu$.
 Stipe 2-4 mm. thick.
- Stipe 5-12 cm. long.
 Pileus yellow.
 Pileus light-grayish-tan; stipe pallid.
 Pileus dull-grayish-brown; stipe darker.
 Pileus dark-brown or reddish-brown when
 moist; stipe mostly white or pallid.
 Margin not striate.
 Margin striate.
 Growing on dead wood.
 Growing on muck soil.
- Pileus about 2.5-5 cm. broad.
 Growing in soil or humus.
 Stipe 2-4 mm. thick.
 Stipe white above, darker below.
 Stipe white throughout.
 Pileus alutaceous when moist.
 Pileus pale-brown when moist.
 Stipe 4-6 mm. thick.
 Pileus gray to drab.
 Pileus dark-brown.
 Spores $8-9 \times 4-5 \mu$.
 Spores $12.5-16 \times 7-9 \mu$.
 Growing among mosses in swamps.
 Stipe whitish.
 Stipe pale above, ferruginous below.
 Stipe pallid, becoming reddish-brown.
 Growing on dead wood; stipe 10-18 cm. long.
 Pileus about 5-15 cm. broad.
 Stipe white, unchanging.
 Stipe yellowish-brown, turning blue when cut.
6. *P. sabulosa*.
 7. *P. squalidella*.
 8. *P. polyccephala*.
 9. *P. atomatoides*.
 10. *P. arenulina*.
 11. *P. agrariella*.
 12. *P. caerulipes*.
 13. *P. latistroma*.
 14. *P. castanella*.
 15. *P. obscura*.
 16. *P. vialis*.
 17. *P. elongatipes*.
 18. *P. Cokeri*.
 19. *P. panaeoliformis*.
 20. *P. foenicisii*.
 21. *P. senex*.
 22. *P. limicola*.
 23. *P. conissans*.
 24. *P. fuscofolia*.
 25. *P. cystidiosa*.
 26. *P. subagraria*.
 27. *P. spadicea*.
 28. *P. castaneifolia*.
 29. *P. nigrella*.
 30. *P. uda*.
 31. *P. dichroa*.
 32. *P. castaneicolor*.
 33. *P. larga*.
 34. *P. caerulescens*.

- I. *PSILOCYBE PHYLLOGENA* Peck, Bull. N. Y. State Mus. 157: 99.
1912

Agaricus phyllogenus Peck, Ann. Rep. N. Y. State Mus. 26: 60.
1874.

Agaricus (*Hypholoma*) *modestus* Peck, Ann. Rep. N. Y. State
Mus. 32: 29. 1879.

Hypholoma phyllogenum Sacc. Syll. Fung. 5: 1042. 1887.

Psathyra conica Peck, Ann. Rep. N. Y. State Mus. 54: 153. 1901.

Psilocybe phyllogena modesta Peck, Bull. N. Y. State Mus. 157:
99. 1912.

Pileus thin, firm, conic or convex, sometimes umbonate, solitary or gregarious, 5-10 mm. broad; surface smooth, glabrous, hygrophanous and reddish-brown when moist, alutaceous or ochraceous when dry, margin incurved, whitened by the remains of a slight veil when young; lamellae adnate, usually with a decurrent tooth, plane, broad, crowded, pallid to purplish-brown, entire and pallid on the edges; spores top-shaped or turnip-shaped, smooth, sometimes apiculate, isabelline with a smoky-purplish-brown tint under the microscope, $6-7 \times 5-6 \mu$; stipe slender, equal, smooth, cartilaginous, silky-fibrillose, hollow, brownish, often expanding at the base into a flat disk, 2-3 cm. long, 1-2 mm. thick.

TYPE LOCALITY: Worcester, New York.

HABITAT: On dead leaves, sticks, and logs of deciduous or coniferous trees.

DISTRIBUTION: New England to the mountains of Virginia.

ILLUSTRATIONS: Ann. Rep. N. Y. State Mus. 54: *pl. H, f. 17-22*.

A very pretty little plant, specimens of which collected by Peck in July are still well preserved at Albany, attached to a sheet containing a sketch. The type specimens of *A. modestus* were collected by Peck at Sandlake in August; while those of *P. conica* were found by him on spruce logs at Floodwood early in September. The spores are quite peculiar, being very broad-shouldered or subtriangular in outline. I found the plant quite common on leaves in woods at Mt. Lake, Virginia, early in July, 1909, and made three collections of it (77, 91, 177). Earle got it at Redding, Connecticut, in July, 1902 (404); and Mrs. Delafield made notes and a colored sketch from specimens found by her (82) at Buck Hill Falls, Pennsylvania, August 15, 1921. In 1910 it

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appeared especially early here in the Garden, having been found by me on sticks and trash on June 20.

2. *PSILOCYBE SUBMACULATA* Atk. Ann. Myc. 7: 375. 1909

Pileus convex, cespitose, 4-10 mm. broad; surface smooth, hygrophanous, dull-brownish, then dull-white with dark, watery and yellowish spots; margin at first incurved; lamellae adnate, emarginate, rather crowded, brownish with a purple tint, white on the edges; spores suboblong to subellipsoid, slightly inequilateral, purple-brown under the microscope; cystidia few; stipe fistulose, even, somewhat flexuous, subcartilaginous to fleshy, shining-white, white-mealy at the apex, with white mycelium at the base, 2-3 cm. long, 2-3 mm. thick.

TYPE LOCALITY: Ithaca, New York.

HABITAT: On very rotten wood in woods.

DISTRIBUTION: Known only from the type locality.

According to Kauffman, Atkinson reported this species from Michigan also. I have not seen any specimens.

3. *PSILOCYBE LIMOPHILA* (Peck) Sacc. Syll. Fung. 5: 1048. 1887

Agaricus limophilus Peck, Ann. Rep. N. Y. State Mus. 30: 42. 1878.

Pileus thin, convex becoming nearly plane, fragile, 1.5-2.5 cm. broad; surface atomaceous, radiately rugulose, whitish, often splitting on the margin, sometimes areolately cracking; lamellae rather broad, subdistant, whitish becoming purplish-brown; spores 10-12 x 5-6 μ ; stipe equal, striate and slightly mealy at the apex, hollow, short, white, 2-2.5 cm. long, 1.5-2 mm. thick.

TYPE LOCALITY: Green Island, Albany County, New York.

HABITAT: On muddy alluvial soil under willows.

DISTRIBUTION: Known only from the type locality.

4. *PSILOCYBE CAMPTOPODA* (Peck) Sacc. Syll. Fung. 5: 1057. 1887

Agaricus camptopus Peck, Ann. Rep. N. Y. State Mus. 31: 35. 1879.

Psilocybe unicolor Peck, Ann. Rep. N. Y. State Mus. 53: 845. 1900.

Psilocybe cavipes House, Bull. N. Y. State Mus. 205-206: 40. 1919.

Pileus thin, broadly convex, gregarious or solitary, 1-2 cm. broad; surface glabrous, hygrophanous, brown and striatulate on the margin when moist, whitish when dry; context white, with a slightly disagreeable taste; lamellae narrow, crowded, adnate or adnexed, whitish becoming brown; spores $6 \times 4 \mu$; stipe equal, straight or curved, glabrous, slightly pruinose or mealy at the apex, paler than the pileus, 1.5-2.5 cm. long, 1-2 mm. thick.

TYPE LOCALITY: Catskill Mountains, New York.

HABITAT: On decorticated decaying logs in woods.

DISTRIBUTION: New York.

Three collections of *P. camptopoda* are at Albany, obtained by Peck at Big Indian, etc. *P. unicolor*, which proves to be the same thing, was collected by Peck in quantity at Savannah, New York, on decaying mossy logs of deciduous trees in October.

5. *Psilocybe caespitosa* sp. nov.

Pileus convex to expanded, often with a broad nipple-like umbo, densely cespitose, 1-2.5 cm. broad; surface smooth, glabrous, hygrophanous to dry, striate over the lamellae when wet, brownish-isabelline to isabelline, the margin incurved and joined to the stipe in young stages by a slight, fibrillose, evanescent veil; context without characteristic odor or taste; lamellae adnate to sinuate, crowded, arcuate, colored like the pileus but with a smoky or purplish tint, beautifully notched on the edges; spores ovoid, smooth, pale-isabelline with a slight purplish tint under the microscope, smoky-purplish-brown in mass, about $7 \times 5 \mu$; stipe subequal, concolorous or paler, darker at the base, shaggy-fibrillose to subglabrous and shining, cartilaginous, fistulose, 1-3 cm. long, 1-2 mm. thick.

TYPE LOCALITY: New York Botanical Garden, New York City.

HABITAT: On or near compost heaps and manure piles.

DISTRIBUTION: New York Botanical Garden.

Collected by W. A. Murrill, June 6, 1910 (*type*); also on June 18, 1911, and July 1 and 2, 1915. Found in abundance.

6. *PSILOCYBE SABULOSA* Peck, Bull. Torrey Club 24: 144. 1897

Pileus convex, subumbonate, 1.5-2.5 cm. broad; surface glabrous, yellow; lamellae broad, subdistant, ventricose, adnate, becoming purplish-brown, whitish on the edges; spores ellipsoid, $12.5-15 \times 7.5 \mu$; stipe equal, hollow, pallid or straw-colored, 2.5-4 cm. long, 2 mm. thick.

TYPE LOCALITY: Rooks County, Kansas.

HABITAT: On sandy soil in pastures, often growing from clumps of living grass.

DISTRIBUTION: Rooks County, Kansas.

Type specimens were collected by Bartholomew (2246) on August 24. He has distributed specimens collected on October 7, 1902. Peck remarks that the umbo in some specimens is quite prominent, while in others it is wholly wanting. *P. arenulina* is said to differ in being hygrophonous and having smaller spores.

7. *PSILOCYBE SQUALIDELLA* Peck, Ann. Rep. N. Y. State Mus. 46: 55. 1893

Agaricus squalidellus Peck, Ann. Rep. N. Y. State Mus. 29: 40. 1878.

Hypholoma squalidellum Sacc. Syll. Fung. 5: 1041. 1887.

Pileus thin, convex, subconic or subcampanulate, expanded when old, gregarious or cespitose, 1-2.5 cm. broad; surface glabrous, hygrophonous, dark-ochraceous and striatulate on the margin when moist, pale-ochraceous or yellow when dry, spore-stained and squalid when old; lamellae broad, subdistant, rounded behind, adnixed, whitish becoming purplish-brown, with white edges; spores 9-12 x 5-8 μ ; stipe slender, stuffed, fibrous, subflexuous, reddish-brown, 2.5-5 cm. long, 2-2.5 mm. thick.

TYPE LOCALITY: Shokan, New York.

HABITAT: On damp ground in woods.

DISTRIBUTION: New York.

According to Peck, this species is abundant on damp, mucky soil in the Adirondack region. It is also quite variable in color and in the shape of the pileus. When moist the latter may be yellow, reddish-yellow, or brown; and when dry either tawny or ochraceous. It is either hemispheric or convex, with the lamellae broad and nearly plane or ventricose. Type specimens of the species and its two varieties, as preserved at Albany, seem quite distinct. Variety *macrosperma* has spores measuring 12-15 x 7-8 μ , and variety *umbonata* has a decided conic umbo. With fresh material at hand, other differences would probably appear.

8. *PSILOCYBE POLYCEPHALA* (Paulet) Peck, Bull. N. Y. State Mus. 157: 55. 1912

Hypophyllum polycephalum Paulet, Traité Champ. pl. III, f. 1, 2; hyponym. 1812-35.

Agaricus polycephalus Fries, Epicr. Myc. 226. 1838.

Psilocybe spadicea polycephala Sacc. Syll. Fung. 5: 1053. 1887.

Pileus fleshy but thin, subcampanulate to convex or nearly plane, densely gregarious or cespitose, 1-3 cm. broad; surface glabrous, even, hygrophaneous, at first whitish with a reddish-yellow center, then darker or brown and striatulate on the margin while moist, paler or whitish when dry; context with a mild taste; lamellae thin, narrow, crowded, adnexed or nearly free, whitish, becoming purplish-brown; spores ellipsoid, purplish-brown, $7-8 \times 4-5 \mu$; stipe equal, straight or flexuous, hollow, glabrous, mealy or pruinose at the apex, white, 2.5-5 cm. long, 2-4 mm. thick.

TYPE LOCALITY: France.

HABITAT: In woods either on the ground about the base of trees or on dead wood.

DISTRIBUTION: New York; also in Europe.

ILLUSTRATIONS: (Paulet & Lév.), Ic. Champ. pl. III, f. 1, 2; Peck, Bull. N. Y. State Mus. 157: pl. 127, f. 1-9.

9. *PSILOCYBE ATOMATOIDES* (Peck) Sacc. Syll. Fung. 5: 1048. 1887

Agaricus atomatoides Peck, Ann. Rep. N. Y. State Mus. 29: 41. 1878.

Pileus thin, fragile, convex or subcampanulate becoming nearly plane, solitary or gregarious, 1.5-2.5 cm. broad; surface rugose, atomate, slightly and evanescently white-floccose, slightly hygrophaneous, grayish or ochraceous-brown, sometimes with a pinkish tint; context mild, cinereous; lamellae moderately broad, subventricose, rounded behind, adnexed, cinereous becoming dark-brown; spores blackish-brown, $7-8 \times 4-5 \mu$; stipe equal, hollow, minutely flocculent when young, pruinose at the apex, whitish, 3-5 cm. long, 2 mm. thick.

TYPE LOCALITY: West Albany, New York.

HABITAT: On the ground and on decaying wood under pine trees.

DISTRIBUTION: New York, New Jersey, Pennsylvania, and Alabama.

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The type specimens were collected by Peck in June. There are two other collections at Albany. I have it from Fort Lee, New Jersey, collected by Earle (1405) on September 15, 1902; from Buck Hill Falls, Pennsylvania, collected twice in August by Mrs. Delafield; from Whitestone, Long Island, collected on September 28 by Mrs. Irving; and from near Bronx Park, collected by myself on September 26. The spores in these last specimens are narrowly ellipsoid, smooth, dark-bay under the microscope, opaque, about $9 \times 5 \mu$. The species seems to lie on the border line between *Psilocybe* and *Psathyrella*.

Specimens collected by Earle, March 9, 1900, on burned ground in pine woods at Auburn, Alabama, scarcely differ from recent New York specimens except in having somewhat smaller spores. They may be described as follows:

Pileus convex, not umbonate and not fully expanding, gregarious, 1-2 cm. broad; surface light-brown, reminding one of a mixture of milk and coffee, smooth and subshining at maturity, clothed when young with long, white hairs that extend downward to the edge, forming a sort of veil, disappearing at an early stage from the disk but remaining until maturity on the incurved margin as a sort of fringe; lamellae adnate, subcrowded, rather narrow, whitish or pallid, becoming dark-brown, with white, entire edges; spores ellipsoid, sometimes curved, rounded at both ends, smooth, dark-purplish-brown under the microscope, about $7 \times 3.5 \mu$; stipe equal, pallid, paler than the pileus, hollow, clothed with white hairs when young and usually fibrillose-scaly, about 3 cm. long and 2-3 mm. thick.

Specimens collected by me, July 9, 1915, on a rotten deciduous stick in the New York Botanical Garden and colored by Miss Eaton were pale-fumose with long, dense, shaggy-fibrillose scales of the same color on pileus and stipe; spores dark-bay, about $9 \times 5.5 \mu$; spore-print almost black. The plant was very delicate and fragile, and the fibrils mostly collapsed soon after picking.

10. *PSILOCYBE ARENULINA* (Peck) Sacc. Syll. Fung. 5: 1057.
1887

Agaricus arenulinus Peck, Ann. Rep. N. Y. State Mus. 30: 42.
1878.

Pileus convex becoming plane or centrally depressed, rarely umbonate, gregarious, 1-3 cm. broad; surface glabrous, hygroph-anous, dark-brown and coarsely striate on the margin when moist, dingy-white when dry; lamellae crowded, adnate, cinnamon-brown,

becoming darker or purplish-brown; spores ellipsoid, smooth, purplish-brown, $10-12 \times 5-6 \mu$; stipe slightly tapering upward, hollow, often radicate and somewhat clavate at the base, whitish, 3-5 cm. long, 1.5-2 mm. thick.

TYPE LOCALITY: West Albany, New York.

HABITAT: In sandy soil.

DISTRIBUTION: New York and Michigan.

The type specimens and also some from Karner are to be seen at Albany. Peck has written on the sheet "Perhaps *ammophilus*," but gives reasons for keeping it distinct. Kauffman reports it from Michigan and remarks that it is near *P. ammophila* Mont., but that his plants were not like those figured by Hard on page 330 of his book.

11. *PSILOCYBE AGRARIELLA* Atk. Ann. Myc. 7: 374. 1909

Pileus thin, convex to expanded, gregarious, 1-2.5 cm. broad; surface hygrophanous, pellucid, striate when moist or slightly rugose, pale-reddish-brown or pale-rufous, drying pale-subochraceous to buff or pinkish-buff; lamellae adnate, dull-purplish-brown, with white edges; spores subellipsoid, smooth, purplish-brown under the microscope, $7-9 \times 4-5.5 \mu$; cystidia lanceolate, $50-65 \times 12-15 \mu$; stipe flexuous, mealy, hollow, rather fragile, concolorous below, shining-white above, whitish-mycelioid at the base, 4-6 cm. long, about 3 mm. thick.

TYPE LOCALITY: Ithaca, New York.

HABITAT: On the ground in woods.

DISTRIBUTION: New York and Michigan.

Kauffman reports this species from two localities in Michigan and says that it differs from *P. cernua* in having a slight veil when young. I have not seen his specimens or the types.

12. *PSILOCYBE CAERULIPES* (Peck) Sacc. Syll. Fung. 5: 1051.
1887

Agaricus caerulipes Peck, Ann. Rep. N. Y. State Mus. 38: 89.
1885.

Pileus thin, subcampanulate becoming convex, obtuse or obtusely umbonate, cespitose or solitary, 1-2 cm. broad; surface glabrous, hygrophanous, slightly viscid, brown and striatulate on the margin when moist, yellowish or subochraceous when dry, the

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center sometimes brownish; lamellae at first ascending, crowded, adnate, grayish-tawny becoming rusty-brown, whitish on the edges; spores 8-10 x 4-5 μ ; stipe slender, equal, flexuous, tenacious, hollow or containing a separable pith, slightly fibrillose, pruinose at the apex, bluish, sometimes whitish above, 2.5-4 cm. long, 1-1.5 mm. thick.

TYPE LOCALITY: South Ballston, New York.

HABITAT: On decaying wood.

DISTRIBUTION: New York.

Specimens are to be seen at Albany from two or three New York localities, all agreeing with the types.

13. *Psilocybe latispora* sp. nov.

Pileus convex to expanded, obtuse or umbonate, gregarious, 1-1.5 cm. broad; surface glabrous, hygrophanous, dark-fuscous and substriate on the margin when moist, becoming ochraceous on drying; context concolorous, with mild but mawkish taste; lamellae adnate, subcrowded, broad, pallid to dark-fuscous; spores very broadly ovoid to subglobose, smooth, pale-smoky-purplish-brown under the microscope, about 7 x 5.5 μ ; stipe equal, fuscous, pruinose at the apex, fibrillose below, fistulose, 2-3 cm. long, 1-2 mm. thick.

TYPE LOCALITY: New York Botanical Garden, New York City.

HABITAT: Along roadsides.

DISTRIBUTION: Known only from the type locality.

Type collected by F. S. Earle (1962) on June 25, 1903. This species has unusually broad spores for the genus.

14. *PSILOCYBE CASTANELLA* Peck, Bull. N. Y. State Mus. 1²: 7. 1888

Pileus thin, convex or subconic becoming plane or slightly depressed in the center, gregarious or subcespitose, 8-16 mm. broad; surface glabrous, hygrophanous, chestnut or umber-brown and striatulate on the margin when moist, pale-alutaceous when dry; context paler than the surface; lamellae crowded, adnate or slightly rounded behind, pale-brown becoming purplish-brown; spores ellipsoid, purplish-brown, 8-10 x 4-5 μ ; stipe equal, flexuous, hollow or stuffed with a whitish pith, slightly silky-fibrillose, brownish or subrufescent with white mycelium at the base, 2.5-5 cm. long, 1-2 mm. thick.

TYPE LOCALITY: Sandlake, New York.

HABITAT: In rich grassy ground by roadsides.

DISTRIBUTION: Known only from the type locality.

The type specimens are well preserved at Albany.

15. *PSILOCYBE OBSCURA* Peck, Bull. Torrey Club 24: 144. 1897

Pileus thin, convex, 1-2 cm. broad; surface hygrophanous, striate, more or less flecked or scurfy with a white, floccose tomentum, brown or reddish-brown; lamellae broad, subdistant, adnate, brown, becoming almost black, whitish-flocculent on the edges; spores ellipsoid, $10-13 \times 6-8 \mu$; stipe slender, hollow, a little paler than the pileus, whitish-tomentose at the base, 2.5-4 cm. long, 2 mm. thick.

TYPE LOCALITY: Kansas.

HABITAT: On rich leaf-mold in woods.

DISTRIBUTION: Known only from the type locality.

The type specimens were collected by Bartholomew.

16. *Psilocybe vialis* sp. nov.

Pileus thin, convex to expanded, gregarious to cespitose, 1-3 cm. broad; surface glabrous, hygrophanous, dark-brown when moist, becoming light-brown when dry, the margin at length striate; context brown with somewhat unpleasant taste; lamellae adnate, crowded, plane, rosy-isabelline to dark-brown; spores ovoid, tapering at both ends, smooth, often guttulate, pale-yellowish under the microscope, about $7-8 \times 3.5-4.5 \mu$; stipe equal, hollow, subfibrillose, concolorous, 4-6 cm. long, 2-4 mm. thick.

TYPE LOCALITY: New York Botanical Garden, New York City.

HABITAT: Along roadsides.

DISTRIBUTION: Known only from the type locality.

Type collected by F. S. Earle (725) on July 27, 1902.

17. *PSILOCYBE ELONGATIPES* (Peck) Sacc. Syll. Fung. 5: 1046.
1887

Agaricus elongatipes Peck, Ann. Rep. N. Y. State Mus. 29: 40.
1878.

Pileus thin, convex becoming nearly plane, gregarious, 1-2.5 cm. broad; surface glabrous, moist, yellow; lamellae broad, subdistant, ventricose, yellowish becoming brown, usually whitish on the edges; spores ellipsoid, $10-12 \times 6-8 \mu$; stipe elongate, fragile, flexuous, stuffed or hollow, slightly silky-fibrillose, pallid or reddish, 7-12 cm. long, 1.5-2 mm. thick.

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TYPE LOCALITY: Greig, New York.

HABITAT: Among sphagnum in marshes and wet places in woods.

DISTRIBUTION: New York.

Plenty of New York material may be seen at Albany. Karner is one of the localities.

18. *Psilocybe Cokeri* sp. nov.

Pileus convex to campanulate, not fully expanding, solitary to gregarious, reaching 2.5 cm. broad; surface glabrous, light-grayish-tan, slightly striate on the margin, which is incurved in young stages; lamellae adnate, rather broad, subcrowded, smoky-brown, becoming darker with age; spores ellipsoid, smooth, purplish-brown in mass, $7-8 \times 4 \mu$; stipe equal, smooth, subcartilaginous, hollow, whitish to dirty-pallid-flesh-colored, 5-7 cm. long, 2-3 mm. thick.

TYPE LOCALITY: Chapel Hill, North Carolina.

HABITAT: In low, moist soil mixed with humus.

DISTRIBUTION: Known only from the type locality.

The specimens were collected on October 24, 1912, by W. B. Cobb and studied by Dr. Coker (621), who sent them to me for determination. When they were a day old, they appeared somewhat deliquescent, suggesting *Coprinus*.

19. *Psilocybe panaeoliformis* sp. nov.

Pileus strongly convex or subcampanulate, only partly expanding with age, solitary to cespitose, reaching 2.5 cm. broad; surface dry, slightly fibrillose to glabrous, dull-grayish-brown; lamellae strongly sinuate or adnexed, sometimes nearly free, ventricose, broad, crowded, dark-gray or tawny to blackish; spores broadly ellipsoid to ovoid, pointed at both ends at times, smooth, olivaceous with a purplish tint under the microscope, about $9 \times 7 \mu$; stipe very slender, equal, slightly fibrillose to glabrous, cartilaginous, hollow, darker than the pileus, 5-10 cm. long, 1-2 mm. thick.

TYPE LOCALITY: Biloxi, Mississippi.

HABITAT: On manure or manured ground.

DISTRIBUTION: Mississippi and Alabama.

The type specimens were collected by Mrs. F. S. Earle on September 2, 1904. Also collected by F. S. Earle at Auburn,

Alabama, October 14, 1900. The aspect of the plant is that of *Panacolus*, but the spores are very distinct.

20. *PSILOCYBE FOENISECII* (Pers.) Quél. Champ. Jura Vosg. 117.
1872

Agaricus foenisecii Pers. Ic. Descr. Fung. 42. 1800.

Pileus conic or campanulate to convex, solitary or gregarious, 1-2.5 cm. broad; surface glabrous, hygrophamous, smoky-brown or reddish-brown, paler when dry, often variegated; context thin, dingy-pallid, without characteristic odor or taste; lamellae adnate or somewhat sinuate, ventricose, broad, not crowded, purplish-fuscous or fuscous-brown, variegated, whitish on the edges; spores ovoid or broadly ellipsoid, smooth or very slightly tuberculate, umbrinous under the microscope, apiculate, about $12 \times 7 \mu$, often reaching $17.5 \times 12 \mu$, very variable in size; stipe slender, equal, hollow, fragile, glabrous or slightly pruinose, pallid to brownish, 5-8 cm. long, 2 mm. thick.

TYPE LOCALITY: Germany.

HABITAT: On lawns or among grass in fields.

DISTRIBUTION: New England to Alabama and west to Wisconsin; also in Europe.

ILLUSTRATIONS: Berk. Outl. Brit. Fungol. pl. 11, f. 5; Bull. N. Y. State Mus. 75: pl. 86, f. 1-11; Cooke, Brit. Fungi pl. 608 (590); Gill. Champ. Fr. pl. 592 (133); Hard, Mushr. f. 267; Hussey, Ill. Brit. Myc. 1: pl. 39, f. 3; Mycologia 3: pl. 40, f. 5; Pers. Ic. Descr. Fung. pl. 11, f. 1; Ricken, Blätterp. Deutschl. pl. 66, f. 8.

21. *PSILOCYBE SENEX* Peck, Ann. Rep. N. Y. State Mus. 41: 70.
1888

Pileus thin, hemispheric, obtuse, 1-2 cm. broad; surface hygrophamous, dark-brown and striatulate on the margin when moist, pale-cinereous and shining when dry, slightly squamulose with superficial, subfasciculate, whitish fibrils, the margin sometimes appearing slightly and fugaciously appendiculate with these fibrils; lamellae broad, subdistant, adnate, grayish or cinereous, becoming brown or blackish-brown, white on the edges; spores brown, $8 \times 5 \mu$; stipe slender, hollow, fragile, floccosely pruinose, white, 3-7 cm. long, 2 mm. thick.

TYPE LOCALITY: Catskill Mountains, New York.

HABITAT: On decaying wood in woods.

DISTRIBUTION: New York and Pennsylvania.

The type specimens collected by Peck are attached to a herbarium sheet and are rather scanty. I found the species in August, 1917, at Delaware Water Gap.

22. *PSILOCYBE LIMICOLA* (Peck) Sacc. Syll. Fung. 5: 1054. 1887

Agaricus limicola Peck, Ann. Rep. N. Y. State Mus. 24: 70. 1872.

Pileus thin, convex becoming nearly plane, gregarious or caespitose, 1.2–5 cm. broad; surface glabrous, hygrophanous, dark-brown and striatulate on the margin when moist, pale-ochraceous-brown and rugose when dry; lamellae crowded, rounded behind, adnexed, cinnamon-brown, darker when old; spores ellipsoid, $10\text{--}12 \times 6\text{--}8 \mu$; stipe slender, equal, brittle, silky, hollow above, stuffed below, whitish, 3–8 cm. long, 1.5–3 mm. thick.

TYPE LOCALITY: Greig, New York.

HABITAT: On damp, muck soil in woods.

DISTRIBUTION: New York.

ILLUSTRATION: Ann. Rep. N. Y. State Mus. 24: pl. 2, f. 9–13.

Excellent type specimens are to be seen at Albany, collected by Peck in September. Other specimens are from Horse Shoe Pond.

23. *PSILOCYBE CONISSANS* Peck, Bull. N. Y. State Mus. 122: 131. 1908

Clitopilus conissans Peck, Ann. Rep. N. Y. State Mus. 41: 64. 1888.

Pileus fleshy but thin, broadly convex becoming nearly plane, caespitose, 2.5–5 cm. broad; surface glabrous, hygrophanous, pale-chestnut or ferruginous and striatulate on the margin when moist, pale-alutaceous or pale-buff and sometimes slightly rugose when dry; context thin, whitish, mild; lamellae thin, crowded, rounded behind, adnexed or rarely adnate, bay verging to dark-purple or liver-colored; spores ellipsoid, smooth, hyaline with a reddish tint under the microscope, brick-red or vinaceous in mass, $8\text{--}10 \times 4\text{--}5 \mu$; stipe equal, rather slender, firm, cartilaginous, glabrous, hollow, curved or flexuous, white and somewhat floccose above, darker below, 2.5–5 cm. long, 2–4 mm. thick.

TYPE LOCALITY: Catskill Mountains, New York.

HABITAT: In humus, especially at the base of trees.

DISTRIBUTION: Maine, New York, Pennsylvania, and Michigan.

Peck found his plants growing in a cluster at the base of an apple tree; Earle got the species at the base of an oak in the New York Botanical Garden; and Miss White found it in Maine at the foot of a maple. I have specimens also from Chappaqua, New York, collected by Mrs. Murrill, and from Buck Hill Falls, Pennsylvania, collected by Mrs. Delafield. It is a very attractive and interesting plant—one never forgets the color of the gills. Peck placed it first in *Clitopilus*, but thought it suggested *Hypholoma* or *Psilocybe*, and afterwards transferred it to the latter genus. The spores are almost hyaline under the microscope—a very peculiar character for *Psilocybe*—but brick-red or purplish in mass, and the general appearance of the hymenophore is much more like *Psilocybe* than *Clitopilus*.

24. *PSILOCYBE FUSCOFOLIA* Peck, Bull. N. Y. State Mus. 157:

100. 1912

Pileus fleshy, thin, conic or hemispheric, becoming convex-plane or centrally depressed, solitary, gregarious or cespitose, 2.5–5 cm. broad; surface glabrous, hygrophanous, alutaceous when moist, subochraceous and rugose when dry; margin even, incurved; context whitish or yellowish; lamellae narrow, thin, crowded, adnate, sometimes forked, pale-brown becoming reddish-brown; spores ellipsoid, brown, $6-8 \times 3-4 \mu$; stipe equal, slender, hollow, silky-fibrillose, white, thickened or subbulbous and whitish-mycelioid at the base, 2.5–4 cm. long, 2–4 mm. thick.

TYPE LOCALITY: New York City.

HABITAT: On soil or on decaying wood in woods or in open places.

DISTRIBUTION: Vicinity of New York City.

25. *PSILOCYBE CYSTIDIOSA* Peck, Bull. N. Y. State Mus. 167: 46.

1913

Pileus thin, convex or subconic, solitary or cespitose, 2–4 cm. broad; surface hygrophanous, glabrous, pale-brown when moist, yellowish-drab with a brownish center and sometimes obscurely striate on the margin when dry, becoming lacerate at times when expanded; context white with a nutty taste; lamellae adnate, crowded, thin, whitish becoming purplish-brown; spores ellipsoid, purplish-brown, $8-10 \times 5-6 \mu$; cystidia $60-80 \times 12-20 \mu$; stipe

equal or slightly tapering upward, hollow, pruinose at the top, white, often with a subglobose mass of earth adhering to the base, 4-5 cm. long, 2-4 mm. thick.

TYPE LOCALITY: Minneapolis, Minnesota.

HABITAT: On the ground.

DISTRIBUTION: Known only from the type locality.

26. *PSILOCYBE SUBAGRARIA* Atk. Ann. Myc. 7: 375. 1909

Pileus convex to expanded, sometimes subumbonate, 3-5 cm. broad; surface silky, gray to drab; lamellae elliptic, adnexed, emarginate, white, then rose to gray, and finally brown with a purple tint, white on the edges; spores suboblong to subellipsoid, slightly inequilateral, smooth, purplish-brown, 8-10 x 4-5 μ ; cystidia hyaline, clavate, 45-55 x 12-15 μ ; stipe fibrous-striate, white with a gray tint, fistulose, subcartilaginous to fleshy, soft, shining, pruinose or silky-fibrillose, 6-8 cm. long, 4-5 mm. thick.

TYPE LOCALITY: Ithaca, New York.

HABITAT: On the ground in woods.

DISTRIBUTION: Known only from the type locality.

I have not seen the type specimens.

27. *PSILOCYBE SPADICEA* (Schaeff.) Quél. Champ. Jura Vosg. 239. 1872

Agaricus spadiceus Schaeff. Fung. Bavar. Ind. 27. 1774. Not *A. spadiceus* Scop. 1772.

Pileus fleshy, rigid, convex becoming nearly plane, obtuse, commonly cespitose, 2.5-6 cm. broad; surface scabrous, even, hygrophaneous, bay or bay-brown when moist, pallid when dry; lamellae crowded, rounded behind, adnexed, dry, whitish becoming pinkish-brown; spores brown, 8-9 x 4-5 μ ; stipe equal, rather tough, glabrous, hollow, even at the apex, whitish, 5-8 cm. long, 4-6 mm. thick.

TYPE LOCALITY: Bavaria.

HABITAT: On the ground among fallen leaves or on and about the base of trees.

DISTRIBUTION: Eastern United States as far south as North Carolina; also in Europe.

ILLUSTRATIONS: Cooke, Brit. Fungi pl. 606 (610); Ricken, Blätterp. Deutschl. pl. 66, f. 7; Schaeff. Fung. Bavar. pl. 60, f. 4-6.

The name used above is preoccupied by *A. spadiceus* Scop., and it will require considerable time to find a synonym that is tenable. Several New York collections at Albany, from Ampersand and elsewhere, agree fairly well with specimens collected by me at Norrköping, Sweden, and named by Romell; while other specimens so named by Peck seem quite distinct and are more like what I found at Kew under this name.

28. *Psilocybe castaneifolia* sp. nov.

Pileus fleshy, rather thick, convex, not fully expanding, gregarious, 2-4 cm. broad; surface strongly hygrophanous, often rugose, dark-fuliginous when moist, pale-ochraceous and somewhat zoned when dry, margin even and incurved; context fuliginous when moist, pallid when dry, with rather strong odor and unpleasant taste; lamellae adnexed, broad, triangular or ventricose, not crowded, pallid to dark-fuscous or castaneous with whitish edges; spores ellipsoid, granular, apiculate, pale-bay under the microscope, dark-smoky-purplish-brown in mass, $12.5-16 \times 7-9 \mu$; stipe slightly tapering downward, pruinose, subconcolorous to pale-ochraceous, cartilaginous, fistulose, 4-6 cm. long, 4-6 mm. thick.

TYPE LOCALITY: New York Botanical Garden, New York City.

HABITAT: On roadsides and in grassy fields.

DISTRIBUTION: New York City.

Type collected by F. S. Earle (1442) on June 14, 1903, and studied in the fresh condition. The dried specimens have chestnut-colored lamellae, which character distinguishes it at once from plants like *Psilocybe spadicea* and from species of *Stropharia* having spores of this size.

29. *PSILOCYBE NIGRELLA* Peck, Bull. N. Y. State Mus. 139: 28.
1910

Pileus thin, broadly convex becoming nearly plane, slightly umbonate, scattered or gregarious, 2.5-4 cm. broad; surface hygrophanous, seal-brown, shining and even or obscurely striate on the margin when moist, raw-umber or mummy-brown when dry; lamellae thin, rather crowded, rounded behind, adnexed, purplish-brown or seal-brown, whitish on the edges; spores ellipsoid, dark-purplish-brown, almost black, $10-12 \times 6-8 \mu$; stipe firm, rigid, equal, stuffed with a slender white pith, silky-fibrillose, whitish; 3.5-7 cm. long, 2.5 mm. thick.

TYPE LOCALITY: Karner, New York.

HABITAT: On damp, mossy ground in swamps.

DISTRIBUTION: New York and Massachusetts.

ILLUSTRATION: Bull. N. Y. State Mus. 139: pl. 3, f. 7-11.

Plants labeled *Naucoria nigrella*, collected by Morris at Natick, Massachusetts, October 13, 1909, appear to be this species. The spores are ellipsoid, tapering at both ends, smooth, purplish-brown under the microscope, 8-10 x 5-6 μ .

30. *PSILOCYBE UDA* (Pers.) Gill. Champ. Fr. 586. 1878

Agaricus udus Pers. Syn. Fung. 414. 1801.

Pileus fleshy, thin, convex becoming plane, gregarious, 2-3 cm. broad; surface rugulose, at least when dry, tawny-bay becoming yellowish; lamellae subdistant, adnexed, ventricose, whitish becoming purplish-brown; spores purplish-brown, 16-20 x 7-9 μ ; stipe equal, elongate, thin, tough, fibrillose, hollow, straight, sometimes slightly wavy, pale above, ferruginous below, 5-8 cm. long, 2-3 mm. thick.

TYPE LOCALITY: Europe.

HABITAT: Among sphagnum and other mosses or grasses.

DISTRIBUTION: Northeastern United States; also in Europe.

ILLUSTRATION: Cooke, Brit. Fungi pl. 569 (594).

Peck's specimens, taken from a sphagnum swamp in New York, and Morris's specimens collected at Natick, Massachusetts, in October, 1907, appear to agree well with specimens from Bresadola and some recently collected by Romell in Sweden. See Kauffman's book, p. 277, for notes on variety *elongata*.

31. *PSILOCYBE DICHROA* (Pers.) P. Karst. Bidr. Finl. Nat. Folk

32: 504. 1879

Agaricus dichrous Pers. Syn. Fung. 343. 1801.

Psilocybe fuscofulva Peck, Bull. N. Y. State Mus. 12: 7. 1888.

Pileus thin, fleshy, conic or campanulate becoming convex, subumbonate, solitary, 2-3.5 cm. broad; surface glabrous, subviscid, subshining, striatulate on the margin, brown or bay-brown, subalutaceous in dry weather; lamellae broad, subcrowded, adnate or adnexed, ventricose, pallid becoming purplish-brown, whitish on the edges; spores purplish-brown, 10-12 x 6-8 μ ; stipe equal or slightly thickened downward, hollow, silky, pallid becoming red-

dish-brown, 4-7 cm. long, 2-4 mm. thick.

TYPE LOCALITY: Northern Europe.

HABITAT: In marshes and wet places; often among sphagnum.

DISTRIBUTION: New York; also in Europe.

A sheet of specimens bearing this name is at Albany, collected by Peck at Karner in October. Another sheet with somewhat smaller plants collected by Peck in sphagnum at Karner (Center) is the basis of Peck's *Psilocybe fuscofulva*.

32. *Psilocybe castaneicolor* sp. nov.

Pileus campanulate, not fully expanding, gregarious, 2-4 cm. broad; surface glabrous, hygrophanous, bright-chestnut when fresh and moist, ochraceous when dry, the margin even or faintly striate with age; context brownish with mild taste; lamellae adnate, crowded, plane, rosy-isabelline to purplish-brown; spores ellipsoid, rounded at one end and slightly flattened but not apiculate at the other, smooth, dark-bay under the microscope, about $14-14.5 \times 9 \mu$; stipe equal, glabrous, white, rigid-fragile, hollow, 10-18 cm. long, 4-5 mm. thick.

TYPE LOCALITY: West Park, New York.

HABITAT: On decayed sticks in wet woods.

DISTRIBUTION: Known only from the type locality.

Type collected on August 8, 1903, by F. S. Earle (1806), who made notes from the fresh specimens and assigned the plant to *Psilocybe*. The margin of even the youngest plants among the dried specimens is perfectly straight, as in the genus *Atylospora*.

33. *PSILOCYBE LARGA* Kauffm. Agar. Mich. 279. 1918.

Pileus fragile, ovoid-campanulate at first, at length expanded to plane, and radiately cracked or split on the margin, gregarious or cespitose, 4-14 cm. broad; surface hygrophanous, bay-brown to ochraceous-brown and even when moist, whitish-tan and radiately rugulose when dry, at first dotted with scattered, small, snow-white, floccose, superficial scales, and quickly denuded, often only with a white-silky margin; context rather thin, white when dry, scissile, homogeneous, with large cells, with no odor or taste; lamellae adnate, rounded behind, rather broad, crowded to sub-distant, white at first, then pale-fuscos, finally umber, minutely white-fimbriate on the edges; spores ellipsoid, smooth, obtuse, purplish-brown under the microscope, umber in mass, $8-9.5 \times 4-5 \mu$; cystidia abundant on the sides and edges of gills, subventricose

to subcylindric, narrow-stalked, obtusely rounded above, 70–80 x 12–15 μ ; stipe stout, equal or tapering upward, soon hollow, terete or compressed, rather firm, usually striate to sulcate, furfuraceous but glabrescent, then shining, white, cortex subcartilaginous, 5–10 cm. long, 5–15 mm. thick.

TYPE LOCALITY: Ann Arbor, Michigan.

HABITAT: About stumps in grassy clearings or woods.

DISTRIBUTION: Vicinity of Ann Arbor, Michigan.

ILLUSTRATION: Kauffm. Agar. Mich. *pl.* 57.

Kauffman found this large and striking species not infrequent in elm swamps or clearings from May to September, but especially in the spring. The stipe seems very thick for this genus, but it is described as subcartilaginous. Specimens were kindly sent me by Dr. Kauffman some time after these studies were completed.

34. *Psilocybe caerulescens* sp. nov.

Pileus convex, slightly umbonate, gregarious or cespitose, 5–7 cm. broad; surface glabrous, slightly viscid when wet, becoming radially striate on the margin, light-dirty-yellowish-brown with a metallic luster suggesting some alloy of brass, darker on the disk, bluish when bruised or handled; context white, tough, unchanging, continuous with the stipe, with a farinaceous odor when cut, and no characteristic taste; lamellae sinuate-adnexed, light-yellow at first, dark-purplish-brown at maturity; spores broadly ovoid or subglobose, smooth, avellaneous with a yellowish tint under the microscope, very distinctive both in color and in shape, about $7 \times 5.5 \mu$; stipe flexuous, equal, pruinose, hollow, concolorous, white at the apex, turning blue when cut, reaching 9 cm. in length and 1 cm. in thickness.

TYPE LOCALITY: Montgomery, Alabama.

HABITAT: In rich soil mixed with humus on the shaded bank of a small stream.

DISTRIBUTION: Known only from the type locality.

The description is drawn from specimens and notes sent me by Dr. R. P. Burke, who found fifteen hymenophores growing in an area about eight feet square. The plant is larger, with thicker stipe, than most species of the genus, but the stipe is decidedly cartilaginous.

DOUBTFUL SPECIES

Psilocybe ammophila (Dur. & Lév.) Sacc. Syll. Fung. 5: 1050. 1887. Described from Algeria, growing in sand along the sea-

shore. I have not seen the type—only specimens from Cavara collected in Italy. Hard refers to this species, plants found in sandy soil during August and September near Columbus, Ohio, and photographed by Dr. Kellerman (see his figure 268).

Psilocybe atrobrunnea (Lasch) Gill. Champ. Fr. 586. 1878. Kauffman reports this species from Ann Arbor, Michigan, growing among sphagnum in tamarack bogs.

Psilocybe canofaciens Cooke, Grevillea 14: 1. 1885. Described from specimens collected in decaying straw in England by W. G. Smith. Cooke's illustration of this species is very characteristic and striking. Kauffman reports it as rare in Michigan, with the same variable spore characters as observed in England by Massee.

Psilocybe cernua (Vahl) Quél. Champ. Jura Vosg. 116. 1872. Described from Denmark. Placed in the genus *Atylospora* by Fayod. Reported by Kauffman as infrequent in Michigan during the autumn months, occurring in clusters at the base of trees. Peck's specimens doubtfully so named, collected on chips at Forestburg, New York, in September, remind me of *Atylospora umbonata*.

Psilocybe clivensis (Berk. & Br.) Sacc. Syll. Fung. 5: 1055. 1887. Described from England and reported from New York by Peck. The specimens attached to a sheet at Albany are too poor to be compared readily with other material.

Psilocybe ericaea (Pers.) Quél. Champ. Jura Vosg. 338. 1873. (*Agaricus ericaeus* Pers. Syn. Fung. 413. 1801.) Described from Europe and reported from New Richmond, Michigan, by Kauffman. I have not seen his specimens, but have several from Europe, including recent collections in Sweden by Romell.

Psilocybe graevolens Peck, Bull. N. Y. State Mus. 167: 47. 1913. Described as follows from specimens collected by Ballou in the Hackensack marshes, New Jersey. No measurements are given by Peck and I have not seen the specimens.

Pileus hemispheric to convex, cespitose; surface glabrous, varying in color from creamy-white to subalutaceous; context pallid, with a strong, persistent odor; lamellae crowded, subventricose, rounded behind, adnexed, brown when mature; spores subellipsoid, $8-10 \times 5-6 \mu$; stipe equal, silky-fibrillose, stuffed or hollow, white.

Psilocybe murcida (Fries) P. Karst. Bidr. Finl. Nat. Folk 32: 507. 1879. (*Agaricus murcidus* Fries, Syst. Myc. 1: 299. 1821.) Described from specimens collected by Fries under beech trees in Sweden. Reported from Michigan by Kauffman as occurring in moist woods during May, June, and September. I have not seen his specimens.

Psilocybe pulicosa (Mont.) Sacc. Syll. Fung. 5: 1056. 1887. (*Agaricus pulicosus* Mont. Syll. Crypt. 124. 1856.) Described from specimens collected on the ground at Columbus, Ohio, by Sullivant. Type not seen.

Psilocybe rhodophaea (Mont.) Sacc. Syll. Fung. 5: 1050. 1887. (*Agaricus rhodophaeus* Mont. Syll. Crypt. 124. 1856.) Described from specimens collected among fallen leaves at Columbus, Ohio, by Sullivant. Type not seen.

Psilocybe semilanceata (Fries) Quél. Champ. Jura Vosg. 338. 1873. (*Agaricus semilanceatus* Fries, Obs. Myc. 2: 178. 1818.) Described from Europe, occurring on manured, grassy ground. Peck's specimens from Bethlehem doubtfully so named do not at all agree with excellent material from Bresadola, Romell, and others.

Psilocybe subericaea (Fries) Sacc. Syll. Fung. 5: 1045. 1887. Described from Sweden. There are several good collections from Alabama in the Garden herbarium and one at Albany bearing this name, but unfortunately they are not accompanied by notes. Although agreeing in a general way with the European species, I doubt if they are the same. The study of fresh plants will decide. I find the spores of the Alabama plants to be ellipsoid, smooth, pale-fulvous with a slight purplish tint under the microscope, purplish-brown in mass, about $14 \times 9 \mu$.

Psilocybe Sullivantii (Mont.) Sacc. Syll. Fung. 5: 1047. 1887. (*Agaricus Sullivantii* Mont. Syll. Crypt. 123. 1856.) Described from specimens collected on naked ground near Columbus, Ohio, by Sullivant. Said to be a very beautiful plant with pileus 11-12 cm. broad and stipe 10 cm. long. Type not seen.

NEW YORK BOTANICAL GARDEN.

MONOGRAPH OF THE NITSCHKIEAE¹

HARRY MORTON FITZPATRICK

(WITH PLATES 1-7)

The subfamily name, Nitschkieae, is here first applied, the group as delimited embracing the genus *Nitschkia* Otth and several other genera which agree with it in the possession among other things of turbinate perithecia collapsing at maturity to cupulate. Although the forms are characteristic, the unity of the group has not been recognized heretofore, the various genera having been placed in rather widely separated positions in the classification. In the present paper a monographic treatment of the world's species of the group is presented.

The investigation was begun several years ago, but the difficulty of obtaining material for examination has considerably delayed publication. Relatively few of the species occur in temperate North America, the paper being based largely on collections of foreign material available in the larger herbaria of the eastern United States. In the winter of 1920-1921 the writer spent a semester in the cryptogamic laboratories at Harvard University, and gave much of the time available for research to the study of this group. He has subsequently studied for briefer periods also at the same institution and in the herbaria of the New York Botanical Garden, Brooklyn Botanic Garden, Missouri Botanical Garden, Philadelphia Academy of Science, Bureau of Plant Industry, and New York State Museum. The type collections of Curtis, Schweinitz, Ellis, Peck, and others, as well as a large number of sets of exsiccata specimens, have thus been made available. The writer desires to express here his appreciation of the many courtesies shown to him by the curators of the various herbaria. He is especially indebted to Professor Roland Thaxter, who not only

¹ The investigation upon which this article is based was in part supported by a grant from the Heckscher Foundation for the Advancement of Research, established by August Heckscher at Cornell University.

gave him access to the exceptionally rich collections at Harvard, but also placed at his disposal a number of unidentified specimens collected in Florida and Trinidad. Material of two species collected in Porto Rico was received from Mr. C. E. Chardon, and a single specimen collected in New Zealand by Professor G. H. Cunningham was obtained from Doctor F. J. Seaver. The type collections of various comparatively unknown species have been obtained for study through the kindly coöperation of a number of individuals. The writer is especially indebted to Professors Mattirola, Patouillard, and Spegazzini for making available specimens in their herbaria.

Realizing that in the preparation of a monograph the examination of the original collection of material of every species is desirable, an effort has been made to see these in all cases. The majority have been obtained for study, but a few are wholly unavailable. Since the species which have not been seen are known only from the type collections, and were inadequately described without figures, it has been necessary to list them as doubtful. It is hoped that the appearance of this paper will stimulate mycologists who live near the type localities to search for these species and distribute material of them. Other species also, known only from a few specimens, should be more widely collected in order that some idea of geographical distribution and a clearer conception of variation in taxonomic characters may be obtained. It is realized that the study of additional material of species now known only from one or two collections may alter somewhat our concept of specific limits.

The new subfamily, Nitschkieae, has been erected tentatively in the face of a puzzling taxonomic situation. As stated above, the genera included have been treated previously in widely separated positions in the classification. In the arrangement of the Sphaeriales in Engler and Prantl's *Die Natürliche Pflanzenfamilien* Lindau includes *Nitschkia* in the Cucurbitariaceae, *Winteria* (cf. *Calyculosphaeria*) in the Amphisphaeriaceae, and *Thaxteria* in the Sphaeriaceae. Likewise in the Saccardo system of classification based on spore characters a wide separation of the genera here included results.

According to Lindau the family Cucurbitariaceae is characterized by the possession of a definite stroma on which the perithecia are seated, and differs in this respect from the Sphaeriaceae in which a stroma is absent. In *Cucurbitaria berberidis*, type species of the Cucurbitariaceae, the perithecia are borne in a cespitose cluster on a pseudoparenchymatous stroma, and are erumpent through the bark of the host. In *Nitschkia Fuckellii* the same situation exists, but in *Nitschkia cupularis* a stroma is wholly absent, the perithecia arising from a hyphoid subiculum which may cover a wide area on the substratum. In fact, in the Nitschkieae as here constituted relatively few species are stromatic. Moreover, in *Calyculosphaeria* indication is given of the transition from a definite stroma to a hyphoid subiculum within a single species. It is not possible, therefore, to maintain the separation between the Sphaeriaceae and Cucurbitariaceae as adopted by Lindau without placing in widely separated groups species which evidently should fall within the limits of a single genus. That the forms embraced here in the Nitschkieae constitute a natural group is indicated by their distinctive external aspect. The turbinate shape of the perithecium and its collapse to cupulate afford points of similarity. The ascigerous cavity and the tapering sterile base of the perithecium as seen in longitudinal section have the same appearance in all species whether they are stromatic or not. Other characters, macroscopic and microscopic, are correlated with these.

Since it is not possible to incorporate the Nitschkieae in any family of the Lindau classification, the inclusion of this new subfamily in its proper place in the taxonomic scheme must await an extensive revision of the Sphaeriales based on a more critical study of other subdivisions of the order. A merging of the Sphaeriaceae and Cucurbitariaceae might be accepted as a temporary solution of the difficulty. Although relatives of the Nitschkieae can not be indicated with certainty, the genus *Fracchiacea* is apparently not widely separated from the group. It differs chiefly in that the perithecia do not become cupulate at maturity. Probably a critical study of the genus will show it to lie in an intermediate position between the Nitschkieae and the genera included by Lindau in the Cucurbitariaceae. The well-known species, *F. callista*, in which

the perithecia are cupulate is wholly unlike *F. subcongregata*, type of the genus, and must be excluded from the genus. Its affinities are clearly with the Coronophoraceae, a widely separated group.

SYSTEMATIC ACCOUNT

NITSCHKIEAE subfam. nov.

Perithecium coriaceous-membranaceous to coriaceous-carbonaceous, black to brownish black, turbinate, collapsing apically to cupulate or rarely laterally shrunk, ostiolate, the terminal broadened portion enclosing a subspheric ascigerous cavity, the basal tapering portion solid and pseudoparenchymatous, seated on a hyphoid subiculum of coarse, brownish-black, multiseptate hyphae characterized by a striking metallic iridescence, or more rarely borne on a definite black, pseudoparenchymatous stroma; vegetative hyphae intramatrical, resembling the threads of the subiculum, and like them abundantly provided with thick septa; asci clavate to subcylindric, evanescent, tapering below into a long thread-like stalk, paraphysate; saprophytic fungi occurring on decaying bark and wood.

KEY TO GENERA

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| A. Perithecia lacking spines. | |
| 1. Ascospores hyaline. | |
| a. Ascospores allantoid, unicellular. | 1. <i>Nitschkia</i> . |
| b. Ascospores straight, more or less fusiform, uniseptate. | 2. <i>Calculosphaeria</i> . |
| 2. Ascospores colored. | |
| a. Ascospores unicellular. | 3. <i>Tympanopsis</i> . |
| b. Ascospores 3-septate. | 4. <i>Thaxteria</i> . |
| B. Perithecia armed with heavy spines. | 5. <i>Acanthonitschkea</i> . |

1. NITSCHKIA Otth, in Fuckel, Symb. Myc. 165. 1869. (Spelled *Nitschkea* by Saccardo.)

?*Cyathisphaeria* Dumort. Comment. Bot. 87. 1822.

Coelosphaeria Sacc. Atti Soc. Veneto-Trentina Sci. Nat. 2: 163. 1873; Syll. Fung. 1: 91. 1882.

Nitschkia Otth, emend. E. & E. N. Am. Pyren. 245, *pro parte*. 1892; Sacc. Syll. Fung. 11: 272, *pro parte*. 1893.

Type species, *Nitschkia Fuckelii* Nitschke.

Perithecia black, coriaceous-carbonaceous, turbinate, collapsing to cupulate, scattered to caespitose, seated on a well-developed pseudoparenchymatous stroma or arising from a hyphoid subicu-

lum of coarse, brownish-black, iridescent hyphae, erumpent or superficial, characteristically tuberculate, apically ostiolate; ostiolum obscure to papilliform; asci thin-walled, evanescent, 8-spored, clavate, tapering to a long thread-like stalk, in some species apically thickened; ascospores curved, more or less allantoid, subbiseriate to crowded, hyaline, continuous, at maturity sometimes centrally and delicately pseudoseptate.

Fuckel (27) published the generic name *Nitschkia* Otth, unaccompanied by a generic description, in *Symbolae Mycologicae*. He describes three species: *N. Fuckelii* Nitschke in litt., *N. tristis* (Pers.) Fuckel, and *N. exilis* (Alb. & Schw.) Fuckel. He states that the first is based on *Sphaeria cupularis* Fries, the second on *S. tristis* Pers., and the third on *S. exilis* Alb. & Schw. In the absence of a generic diagnosis the first-named species, *N. Fuckelii*, must be accepted as the type of the genus. In it the spores are unicellular and curved as figured by Fuckel. In the second species, *N. tristis*, the spores are straight and 1-septate. Von Höhnelt (36) noted this fact and transferred the species from *Nitschkia* to *Winterina*. The third species, *N. exilis*, has perithecia wholly unlike those of *Nitschkia*, and has been transferred to the genus *Niesslia*.

The binomial *Sphaeria cupularis* was first used by Persoon (53, 55). He regarded his species as identical with the earlier described *S. cucurbitula* var. *nigrescens* Tode (85). Fries (24, 25) uses the Persoon name, and cites *S. Pruni* Schum. (72) as synonymous. Moreover, he distributed exsiccati specimens² illustrating the species. Since authentic material from the herbaria of Tode, Persoon, and Schumacher is not available, and since the descriptions and figures given by these older writers are in no case adequate for a certain identification, it seems best to base our conception of the species on the material of Fries, a portion of which has been available for study.

Although Fuckel (27) states that *Nitschkia Fuckelii* Nitschke is based on *Sphaeria cupularis* Fries, a comparison of the material distributed by him in *Fungi Rhenani* with that distributed by Fries proves that two fungi are represented. They are included here as *N. Fuckelii* and *N. cupularis* respectively. The first differs from

² Fries, Secler. Suec. Exsic. 231.

the second in having a definite pseudoparenchymatous stroma and smaller perithecia. In *N. cupularis* a hyphoid subiculum is developed.

The genus *Cyathisphaeria* was founded by Dumortier (16) in *Commentationes Botanicae*. He gives a brief and inaccurate generic diagnosis, "*Sphaerulae aggregatae, astomeae, stromate insertae*," followed by an enumeration of six species, the first named being *C. cupularis*, based on *Sphaeria cupularis* Pers. Since *S. berberidis* and several other unrelated species are included the genus has no value. Moreover, it is impossible to use the name *Cyathisphaeria* to replace *Nitschkia* on account of uncertainty as to the identity of *S. cupularis* Pers.

Saccardo (65) published *Coelosphaeria* in 1873 to replace *Nitschkia* Otth because of the existence in the diatoms of the older name, *Nitzschia* Hassall 1845, of similar sound. Although as originally published the name *Coelosphaeria* was unaccompanied by a generic description, Saccardo (64) later provided it with one, and included in the genus several species in addition to those incorporated in *Nitschkia* by Fuckel. As the type of the genus he cites the type species of *Nitschkia*, *N. Fuckelii*. Incidentally he changes the original spelling of *Nitschkia* to *Nitschkea*, the genus having been named for Nitschke.

Ellis (20) limited the genus *Nitschkia* to include only those species in which the perithecia are cespitose, and recognized the genus *Coelosphaeria* for those in which they are scattered. Saccardo (64) accepted this separation, and it has been employed by Berlese (5) and others.

From the standpoint of present-day procedure in nomenclature *Coelosphaeria* has no standing whatever and must be abandoned. Saccardo was not justified in replacing *Nitschkia* Otth with *Coelosphaeria*, as *Nitschkia* is hardly to be regarded as a homonym of *Nitzschia*. Moreover, Ellis in applying the name *Nitschkia* in connection with its original type deprives *Coelosphaeria* of its monotype. The genus *Coelosphaeria* as emended by Ellis includes four species, no one of which is sufficiently close in its relationships to *Nitschkia* to fall within the scope of the present monograph.

Although the original publication of the name *Nitschkia* Otth

was unaccompanied by a generic description, the three species included were adequately described, and figures and herbarium specimens were cited in each case. Since there is no uncertainty as to the identity of the type species, the retention of the generic name seems desirable. In the selection of lists of *genera conservanda* for the fungi it is recommended that *Nitschkia* Othb be included.

Thirty-two species have been described either as *Nitschkia* or *Coelosphaeria*. In the present revision only three of these are included in *Nitschkia*, a single new species being described. Of the remaining twenty-nine species, nine have been transferred to the related genera *Calyculosphaeria*, *Tympanopsis*, and *Thaxteria*, thirteen are definitely excluded from the Nitschkieae, and seven remain as doubtful due to the inadequacy of the original descriptions and the lack of authentic material for examination. The following list indicates the status of each species. In those cases in which a species has been included in the past both in *Nitschkia* and *Coelosphaeria* it is here listed as originally described. Further information concerning the doubtful and excluded species is given at the end of the treatment of *Nitschkia*.

<i>C. acervata</i> Karst.	excluded
<i>C. anceps</i> Sacc. & Malbr.	doubtful
<i>N. Beccariana</i> (Berl. & Pegl.) Kuntze	<i>Tympanopsis</i>
<i>N. bambusarum</i> Rehm	excluded
<i>C. calyculus</i> (Mont.) Sacc.	<i>Calyculosphaeria</i>
<i>C. chiliopyxis</i> (B. & C.) Sacc.	excluded
<i>N. collapsa</i> (Romell) Chentantais	<i>Calyculosphaeria</i>
<i>C. corticata</i> E. & E.	excluded
<i>C. crustacea</i> Karst.	doubtful
<i>N. cupularis</i> Karst.	<i>Nitschkia</i>
<i>N. cuomphala</i> (B. & C.) E. & E.	<i>Tympanopsis</i>
<i>N. exilis</i> (Alb. & Schw.) Fuckel	excluded
<i>N. Flageoletiana</i> Sacc.	excluded
<i>N. Fuckelii</i> Nitschke	<i>Nitschkia</i>
<i>C. fusariospora</i> E. & E.	excluded
<i>C. Granati</i> H. Fabre	doubtful
<i>N. javanica</i> Henn. & Nym.	<i>Nitschkia</i>
<i>C. leptosporoides</i> Wint.	<i>Thaxteria</i>
<i>C. media</i> Sacc.	doubtful
<i>N. moravica</i> Niessl	doubtful

<i>N. pawridia</i> B. & C.	excluded
<i>N. pezizoidea</i> (Pat. & Gaill.) Kuntze	<i>Calyculosphaeria</i>
<i>C. pusillima</i> Speg.	excluded
<i>N. radicalis</i> (Cooke) Kuntze	excluded
<i>C. recedens</i> (Niessl) Berl.	excluded
<i>C. roseospora</i> Pat.	excluded
<i>N. rugulosa</i> (Rick.) v. Höhn.	<i>Thaxteria</i>
<i>N. subconica</i> Feltg.	doubtful
<i>N. subconnata</i> (B. & C.) Kuntze	excluded
<i>C. suberis</i> Wint.	doubtful
<i>N. tristis</i> (Pers.) Fuckel	<i>Calyculosphaeria</i>
<i>N. Winteriana</i> Sacc.	<i>Calyculosphaeria</i>

In the following key the species are separated into two groups. In the first, typified by *N. Fuckelii*, the perithecia are borne on a pseudoparenchymatous stroma; in the second, typified by *N. cupularis*, they are seated on a hyphoid subiculum. Since the perithecia in the stromatic forms are typically cespitose, the separation recalls that of Ellis for *Nitschkia* and *Coelosphaeria*. However, in the light of the relative meagerness of our knowledge of the group, and considering the small number of species included, there is no justification for splitting the genus on the basis of the presence or absence of stromatic tissue. Von Höhnelt (35) and Chentantais (11) have both emphasized this fact.

KEY TO THE SPECIES OF NITSCHKIA

- A. Perithecia borne on a pseudoparenchymatous stroma, densely gregarious to cespitose.
1. Perithecia small, 200–270 μ in diameter; ascospores 9–11 \times 2 μ .
 1. *N. Fuckelii* (Figs. 3, 20, 36).
 2. Perithecia large, reaching 600 μ in diameter. ascospores 15–20 \times 3–3.5 μ .
 2. *N. floridana* (Figs. 4, 18, 37).
- B. Perithecia seated on a hyphoid subiculum, scattered to densely gregarious.
1. Ascospores 9–16 \times 2 μ .
 3. *N. cupularis* (Figs. 1, 2, 19).
 2. Ascospores 18–22 \times 9–12 μ .
 4. *N. javanica*.

I. NITSCHKIA FUECKELII Nitschke, in Fuckel, Symb. Myc. 165.
1869

Coelosphaeria Fuckelii Sacc. Atti Soc. Veneto-Trentina Sci. Nat.
2: 163. 1873.

Winteria tuberculifera var. *caespitosa* E. & E. N. Am. Pyren. 212.
1892.

ILLUSTRATIONS: Fuckel, *Symb. Myc. pl. 3, fig. 1.* Berl. Ic. Fung. 3: *pl. 30.*

(Figures 3, 20, 36)

Perithecia erumpent through crevices in the bark, cespitose, forming pulvinate, hemispheric or elongated groups, 0.5–5.0 mm. in diameter, containing several dozen individuals, borne on a well-developed pseudoparenchymatous stroma, black, glabrous, tuberculate, turbinate, the apex provided with a papilliform ostium evident both before and after collapse, 200–270 μ in diameter, frequently irregular from lateral pressure; asci clavate, 8-spored, thin-walled, chiefly 25–35 \times 10 μ (p. sp.), tapering to a thread-like base; spores allantoid, subbiseriate to crowded, hyaline, provided at each end with a single, small, bright, refractive globule, 9–11 \times 2 μ .

Differing from *N. cupularis* chiefly in the possession of a definite pseudoparenchymatous stroma, and in its smaller perithecia and somewhat shorter spores.

MATERIAL EXAMINED

- Fuckel, *Fungi Rhen. Exsic. 968* (at Harvard Univ.).
 Berk. Brit. Fungi 174 (at Harvard Univ. and Missouri Bot. Gard.).
 Karst. Fungi Fenn. Exsic. 861 (at Harvard Univ.).
 Sydow, *Myc. Mar. 1915, 2430, 4131* (at N. Y. Bot. Gard. and Harvard Univ.).
 Roum. Fungi Gall. Exsic. 1488 (at Cornell Univ. and Harvard Univ.).
 Thüm. *Myc. Univ. 1947* (at N. Y. Bot. Gard., Harvard Univ., and Bur. Pl. Ind.).
 Moug. & Nestl. *Stirp. Crypt. Vogeso-Rhen. 771* (at N. Y. Bot. Gard.).
 Herb. Barbey-Boiss. 591, *ex Herb. Fuckel* (at Harvard Univ.).
 Ellis Herb. 1535, 1777b, labelled *Winteria tuberculifera* var. *caespitosa* (at N. Y. Bot. Gard.).

2. *Nitschkia floridana* sp. nov.

TYPE: In Herb. R. Thaxter at Harvard Univ. (portion of type collection deposited as 1894 in Herb. Fitzpatrick).

(Figures 4, 18, 37)

Perithecia 350–600 μ in diameter, coarsely roughened with large, irregular warts, black, shiny, densely gregarious to cespitose, frequently irregular in shape from crowding, completely collapsing apically but due to the extreme roughness of the wall failing to assume a definite cupulate aspect, seated on a prominent, pseudo-parenchymatous stroma, superficial on decorticated wood, not erumpent; subiculum lacking; ostiolum obscure; asci clavate, long-stipitate, thin-walled, evanescent, 35–60 \times 9 μ (*p. sp.*), 8-spored, not apically thickened; spores typically allantoid, occasionally straight, subbiserial to crowded, hyaline, continuous, in age developing a central pseudoseptum, 15–20 \times 3–3.5 μ , prominently guttulate.

On decorticated wood in Florida.

MATERIAL EXAMINED

Herb. R. Thaxter at Harvard University, *type*, collected by R. Thaxter at Daytona, Florida, January 1898 (portion of type collection deposited as 1894 in Herb. Fitzpatrick); another collection made by R. Thaxter at Cocoanut Grove, Florida, October 1897 (portion deposited as 1896 in Herb. Fitzpatrick).

3. NITSCHKIA CUPULARIS Karst. Myc. Fenn. 2: 81. 1873

?*Sphaeria cucurbitula* var. *nigrescens* Tode, Fungi Meckl. 2: 39. 1791.

?*Sphaeria cupularis* Pers: Obs. Myc. 65. 1796; Syn. Fung. 53. 1801.

?*Sphaeria Pruni* Schum. Enum. Pl. Saell. 2: 164, 165. 1803.

Sphaeria cupularis Fries, Sv. Vet.-Akad. Handl. 37: 112. 1817; Syst. Mycol. 2: 416. 1823.

Cucurbitaria cupularis Gray, Nat. Arr. Brit. Pl. 1: 519. 1821.

Cyathisphaeria cupularis Dumort. Comment. Bot. 87. 1822.

Hypoxylon cupulare Kickx, Fl. Crypt. Louvain 114. 1835.

Cucurbitaria cupularis Cooke, Handb. Brit. Fungi ed. 2: 842. 1871.

Coelosphaeria cupularis Karst. Medd. Soc. Faun. Fl. Fenn. 5: 42. 1879.

ILLUSTRATIONS: Berl. Ic. Fung. 3: pl. 29 under *Nitschkia tristis* is apparently this species.

(Figures 1, 2, 19)

Perithecia erumpent through crevices in the bark, occasionally more or less superficial, gregarious, black, minutely roughened, not definitely tuberculate, turbinate, 300–450 μ in diameter, the flattened apex provided with a prominent, central, papilliform ostiolum, the base supplied with a tuft of prominent, coarse, brown hairs, 6–7 μ in diameter, which radiate over the substratum and mingle with others from neighboring individuals forming a definite, hyphoid subiculum; no evidence of stromatic tissue; collapse first indicated by a circular depression around the papilla, finally complete, the perithecium becoming deeply cupulate with the papilla evident in the bottom of the cup; asci clavate, 8-spored, 22–40 x 8–12 μ (*p. sp.*), thin-walled except at the apex where a peculiar hyaline thickening is developed, tapering to a thread-like base, evanescent; spores curved, subbiserial to crowded, hyaline, often provided with terminal guttulæ as in *N. Fuckelii*, continuous, in age multiguttulate and pseudoseptate, 9–16 x 2 μ .

Nitschkia cupularis as treated in the literature is a composite species, including the species segregated above as *N. Fuckelii*. As here treated it is based on the material distributed by Fries to illustrate "*Sphaeria cupularis* Pers. ex Fries." Since doubt exists as to its identity with *S. cupularis* Pers., the synonymy given above is of doubtful value. The species has been generally misunderstood. Von Höhnelt (36) points out that a number of exsiccati specimens purporting to represent it are merely aged collections of *Gibberella pulicaris*, and the writer has on several occasions found that material labelled *Nitschkia cupularis* was in reality old and blackened *Nectria cinnabarina*. This confusion in exsiccati combined with the fact that two or more species have been included under the one name has made a clear understanding of the species difficult to obtain.

MATERIAL EXAMINED

Fries, Scleromyc. Suec. 231 (at Harvard Univ.).

Plowr. Sphaer. Brit. 63 (at Harvard Univ.).

Rehm, Ascom. 1743 (at Harvard Univ. and in Bur. Pl. Ind.).

4. NITSCHKIA JAVANICA Henn. & Nym. Monsunia 1: 167. 1900

Thaxteria javanica v. Höhn. Ann. Myc. 16: 75. 1918.

TYPE: In Herb. Hennings (a slide in Herb. Fitzpatrick made

from single perithecium shows hyphae of subiculum, but not asci or spores).

Perithecia scattered to cespitose, borne on a subiculum of brown hyphae, $3-4\mu$ in diameter, turbinate with a papilliform ostium, radiately substriate to subrugose, approx. 1 mm. in diameter; asci clavate, obtuse, base attenuated, $100-120 \times 10-12\mu$; spores obliquely uniseriate, oblong-subcylindric, subcurved, $2-3$ -guttulate, $18-22 \times 9-12\mu$.

Java, on decaying branches, July 1898, E. Nyman.

A portion of the type material was received in a much crumbled condition, and only a single perithecium was obtained for study. It was used in the preparation of a microscopic mount, but yielded no asci or spores. It was cupulate, having been turbinate before the collapse, and was attached to the brown hairs of the subiculum. The above description is based on the original diagnosis. Von Höhnelt (36) states that the species should be transferred from *Nitschkia* to *Thaxteria*, but does not say that he has studied material of it. Although our knowledge of the species is very incomplete, there seems to be justification for retaining it in the genus *Nitschkia*.

DOUBTFUL SPECIES OF NITSCHKIA

The following seven species, placed by their authors in *Nitschkia* or *Coelosphaeria*, may for the present be listed as doubtful members of the genus *Nitschkia*. They are known only from the type collections, and the writer's efforts to obtain material for study have been unsuccessful. The original descriptions are in every case inadequate and unaccompanied by illustrations.

1. *COELOSPHAERIA ANCEPS* Sacc. & Malbr. Atti Ist. Veneto VI. 1: 1273. 1882

Nitschkia anceps Berl. Ic. Fung. 3: 23, 24. pl. 31. 1900.

The type collection of this species is represented by a fragmentary specimen in the herbarium of Saccardo. It has not been available to the writer, but Berlese (5) states that his figures are drawn from it. A translation of the original description follows:

"*Perithecia erumpent-superficial, in minute subcircular groups 1 mm. in diam., densely crowded, globose, becoming cupulate,*

black, $1/5-1/6$ mm. in diam.; ostiolum obscure; context pseudo-parenchymatous, black; asci clavate, tapering below, $60-63 \times 8-10 \mu$, surrounded by broad septate paraphyses, 8-spored; ascospores biseriate, allantoid, straight to curved, $10-14 \times 3 \mu$, bi- to quadriguttulate, hyaline."

2. COELOSPHAERIA CRUSTACEA Karst. Acta Soc. Faun. Fl. Fenn.

27: 7. 1905

Nitschkia crustacea Sacc. & Trott. Syll. Fung. 22: 68. 1913.

A translation of the original inadequate description follows: "*Perithecia* very much crowded, beautifully cupulate, black, naked, very minute; asci cylindric-clavate, 8-spored; spores subbiserial, elongated, curved to straight, hyaline, $8-12 \times 2 \mu$."

A specimen collected by J. F. Brenckle (9) at Wirth Lake, Kulm, North Dakota, and distributed by him⁸ was examined by Rehm and identified as questionably this species. This material has been examined by the writer, and although it can not be said to differ in any respect from the description given by Karsten, it is certainly not a *Nitschkia*.

3. COELOSPHAERIA GRANATI H. Fabre, Ann. Sci. Nat. VI. 15:

31-69. 1883

Nitschkia Granati Kuntze, Rev. Gen. 3²: 501. 1898.

The original description translated follows: "*Perithecia* buried in the bark, erumpent, scattered to caespitose, $1/3$ mm. in diam., globose, apically flattened to somewhat cupulate; ostiolum papillate, occasionally rostrate; asci cylindric-clavate, sessile, 8-spored, $40-50 \times 6-7 \mu$; ascospores subbiserial, cylindric, curved, hyaline, provided at each end with a refractive guttule, $10 \times 2 \mu$."

4. COELOSPHAERIA MEDIA Sacc. Michelia 2: 592. 1882

This species is figured by Berlese (5) from the original specimen, but the figure can not be said to demonstrate that the fungus is in reality a *Nitschkia*. A portion of the type collection was sent to the writer from the herbarium of Saccardo, but failed to show perithecia of *Nitschkia*. Von Höhnelt (36) regards the

⁸ Brenckle, N. D. Fungi 700.

species as perhaps a member of the genus *Loranthomyces*. The original description translated is as follows: "*Perithecia* cespitose, erumpent, globose to depressed, then umbilicate, $1/3$ mm. diam., rugulose-shaggy, black; asci clavate, short stalked, $20 \times 6-7 \mu$ (*p. sp.*), 8-spored; spores biseriate, allantoid, $8-9 \times 1.5-2 \mu$, quadriguttulate, hyaline."

5. NITSCHKIA MORAVICA Niessl in Paul, Verh. Naturforsch. Ver. Brunn 47: 139, 140. 1908

A translation of the original description follows: "*Perithecia* aggregated, often densely cespitose, 0.2 mm. in diam., subovoid, collapsing to cupulate, nearly black, fibrous at the base; asci clavate, long stipitate, $50-70 \mu$ (*p. sp. 40*) long, 12μ wide, 8-spored; spores 1-3-seriate, cylindric, curved, hyaline, ends obtuse and each provided with one oil globule, $10-11 \times 2-3 \mu$."

6. NITSCHKIA SUBCONICA Feltg. Rec. Mém. Soc. Bot. Luxemb. 15: 201. 1902

From the original description this species seems not to be one of the Nitschkieae, but since material has not been examined it can not yet be definitely excluded from the group.

7. COELOSPHAERIA SUBERIS Wint. Bol. Soc. Brot. 1883: 17. 1884
Lasiosphaeria suberis Cooke, Grevillea 15: 122. 1887.
Nitschkia suberis v. Höhn. Ann. Myc. 16: 105. 1918.

The original description translated follows: "*Perithecia* scattered to gregarious, superficial, lacking a subiculum, lenticular, finally collapsed to concave, black, rugulose and very sparingly covered with very short, brown, septate hairs. Asci cylindric, tapering somewhat at both ends, sessile, 8-spored, $80-90 \times 10 \mu$, surrounded by filiform paraphyses; ascospores irregularly biseriate, allantoid, almost semicircular, hyaline, continuous, $17-23 \times 3-5 \mu$."

EXCLUDED SPECIES

The following thirteen species placed by their authors in *Nitschkia* or *Coelosphaeria* are here excluded from the Nitschkieae. Authentic material has been examined in practically every case.

The fungi lack the essential characters of *Nitschkia* and its relatives. Nine additional species have been transferred to *Calyculosphaeria*, *Tympanopsis*, and *Thaxteria*.

I. COELOSPHAERIA ACERVATA Karst. Medd. Soc. Faun. Fl. Fenn.
5: 55. 1879

Nectri Coryli Fuckel, Symb. Myc. 180. 1869.

In the original description of this species Karsten (39) states that the perithecia are red. Moreover, in a later paper (40) he cites his binomial as a synonym of *Nectria Coryli* Fuckel. Berlese (5) points out that the appendiculate spores place the species in *Aponectria*.

2. NITSCHKIA BAMBUSARUM Rehm, Leaf. Philippine Bot. 8:
2956. 1916

Material identified by Rehm⁴ has been examined and found to lack the essential characters of the Nitschkieae. The perithecia are spheric, possess a prominent beak, and do not become cupulate. The spores, though allantoid, are in mass distinctly yellowish. The species is of doubtful relationships.

3. COELOSPHAERIA CHILIOPYXIS (B. & C.) Sacc. Syll. Fung. 1:
95. 1882

Sphaeria chiliopyxis B. & C. Grevillea 4: 141. 1876.

Nitschkia chiliopyxis Kuntze, Rev. Gen. 3²: 501. 1898.

The material on which this species was erected was collected by Ravenel at Aiken, South Carolina. The writer has seen a portion of the type collection in the herbarium of Curtis as well as several co-type specimens. In none of these have asci or spores been found. The bodies described as perithecia are minute (85-170 μ), black, shiny, tuberculate spheres seated directly on the fibers of the wood, evident mycelium being absent. They lack an ostium, and there is in reality nothing to indicate that they are fruit-bodies. They resemble somewhat the bulbils of *Papulospora*. The assumption of Berlese (5) that they are the pycnidia of *Aposphaeria* is unwarranted.

⁴ Baker, Fungi Malay. 168.

4. COELOSPHAERIA CORTICATA E. & E. Proc. Acad. Phila. 1890: 221. 1890

Nitschkia corticata Kuntze, Rev. Gen. 3²: 501. 1898.

This species was collected by C. H. Demetrio⁵ on bark of dead *Maclura aurantiaca* at Emma, Missouri, November 1889, and is known only from the type collection. The writer has examined portions of this collection in the herbarium of Ellis at the New York Botanical Garden, and in the Everhart Herb. at Harvard University. The fungus is apparently an undescribed species of *Coronophorella*.

5. NITSCHKIA EXILIS (Alb. & Schw.) Fuckel, Symb. Myc. 165. 1869

Sphaeria exilis Alb. & Schw. Consp. Fung. 44. 1805.

Chaetomium pusillum Fries, Syst. Myc. 3: 255. 1829.

Venturia Chaetomium Ces. & de Not. Schema, in Comm. Soc. Crit. Ital. 1: 225. 1863.

Niesslia Chaetomium Auerswald in Gonn. & Rab. Myc. Eur. 5-6: 30. 1869.

Coelosphaeria exilis Sacc. Syll. Fung. 1: 92. 1882.

Niesslia exilis Wint. in Rab. Krypt.-Fl. 1²: 196. 1887.

Authentic specimens of *Sphaeria exilis* Alb. & Schw. have been studied in the herbaria of Schweinitz and Curtis. The material was collected at Niesky in Lusatia. Several other specimens unquestionably of the same fungus have been seen. One of these was collected by Curtis (15) at Society Hill, South Carolina, the others are specimens distributed by Fuckel,⁶ Karsten,⁷ and Jaap.⁸ A specimen in the herbarium of Curtis collected by Schweinitz at Nazareth, Pennsylvania, and labelled *Sphaeria exilis* Alb. & Schw. is not this species. It shows colored 3-septate spores and is *Melanomma exile* (Schw.) E. & E. Moreover, the American material in the herbarium of Schweinitz differs from the type collection from Niesky.

⁵ Herb. Demetrio 272.

⁶ Fuckel, Fungi Rhen. 2023.

⁷ Karst. Fungi Fenn. Exsic. 876.

⁸ Jaap, Fungi Sel. Exsic. 187.

Sphaeria exilis Alb. & Schw. has been found to have 2-celled spores and should probably bear the name *Niesslia exilis* (Alb. & Schw.) Wint. (90). Although included by Fuckel in the genus *Nitschkia*, it lacks the essential characters of the Nitschkieae as here treated.

6. NITSCHKIA FLAGEOLETIANA Sacc. Manipolo di Micromiceti nuovi. Rend. Congresso Bot. Palermo 48. 1902

Bertia parasitica H. Fabre, Ann. Sci. Nat. VI. 9: 95. 1878.

Homostegia parasitica Rehm, Hedwigia 26: 97. 1887.

Microthyrium epimyces Sacc., Bomm. & Rouss. in Bomm. & Rouss.

Bull. Soc. Bot. Belg. 26: 209. 1887; Hedwigia 26: 97. 1887.

Myiocopron Flageoletianum v. Höhn. Sitzungsber. K. Akad. Wiss.

Wien 124: 18, 19. 1915.

Trichothyrium epimyces Theiss. Ann. Myc. 14: 430-432. 1916.

Loranthomyces epimyces v. Höhn. Sitzungsber. K. Akad. Wiss.

Wien 126: 283-352. 1917.

This species has been variously placed by different writers. The perithecium is well figured by Chentantais (11), and is shown to be of the flat, shield-shaped type. Von Höhnelt has referred the fungus to the genus *Loranthomyces* and Theissen and Sydow (83) include it in this genus in the family Trichothyriaceae. The writer has examined a number of exsiccati specimens distributed under the various names listed in the above synonymy and has found them all to be the same. The species is not as suggested by Rehm identical with *Dothidea episphaeria* Peck. Examination of the type material of this fungus shows it to be very different.

7. COELOSPHAERIA FUSARIOSPORA E. & E. Jour. Myc. 4: 62-65. 1888. (Misspelled *fusariispora* in N. Am. Fungi, 3016.)

The type material of this species in the herbarium of Ellis has been studied. Other authentic specimens have also been examined. The ascospores at maturity are clearly 1-septate and narrow fusoid, the perithecia are spheric, a stroma or subiculum is absent, and paraphyses are abundant. Although the perithecia collapse to cupulate, the species can not be regarded as closely related to *Nitschkia*. It is strikingly similar to *Winteria rhuina* E. & E. and

may be the same. Von Höhnelt suggests that the species may be a *Leptospora*.

8. NITSCHKIA PAURIDIA B. & C. Grevillea 20: 107. 1891

Sphaeria pauidia B. & C. in Herb.

Fracchiaea pauidia Berl. Ic. Fung. 3: 25. 1900.

The original description of *Nitschkia pauidia* B. & C. is based on Curtis's specimen 1413. In his herbarium there is a packet of material labelled by him as follows: "*Sphaeria Meliae* ? Schw. (1413) *Meliae* Ram. mort. Sept. 1847, Society Hill, South Carolina." In manuscript which accompanies his specimens he cancelled the name *S. Meliae* and substituted *S. pauidia*, but he neglected to make this change on the packet. The fungus is not *S. Meliae* Schw. A portion of the type collection of the latter species deposited in the Curtis herbarium and labelled "*Sph. Meliae* Schw. No. 298" shows an entirely different sort of fungus.

The asci of *N. pauidia* B. & C. are polysporous. This fact was recognized by Curtis, for he pictures an ascus on the packet of material. It is strange that Cooke overlooked the point. Berlese figures the fungus and describes it as *Fracchiaea pauidia* (B. & C.) comb. nov. The perithecia are black, turbinate, erumpent in clusters of ten or more, and resemble in form and habit those of *F. subcongregata* (B. & C.) E. & E., type of the genus. They bear short spines as in this species and possess a noticeable papilliform ostium.

9. COELOSPHAERIA (?) PUSILLIMA Speg. Anal. Soc. Ci. Argent. 47: 269. 1899

A portion of the type collection of this species, kindly forwarded by Professor Spegazzini, has been examined and found to be very unlike *Nitschkia* and its relatives. The perithecium is minute (approx. 150μ in diam.) and is provided with a prominent beak. A stroma is absent and the perithecia are scattered or occasionally loosely aggregated. There is no evidence of superficial hyphae and the perithecium does not collapse. The species would seem to belong to *Ceratostomella* rather than to *Coelosphaeria*.

10. *NITSCHKIA RADICALIS* (Cooke) Kuntze, Rev. Gen. 3²: 501.
1898

Cucurbitaria radicalis Cooke, Grevillea 7: 51. 1878.

Coelosphaeria radicalis Sacc. Syll. Fung. 1: 93. 1882.

Material distributed by Ravenel⁹ has been examined at Harvard, the New York Botanical Garden, and Cornell. The fruit-bodies possess a beaked ostium, and are flask-shaped, cespitose, and erumpent. No asci were found. Brown 2-celled oval pycnospores are present. The fruit-body is evidently a pycnidium. The fungus has been variously treated, being placed by different authors in *Dothiorella*, *Diplodia*, *Botryodiplodia*, etc. Regardless of whether the form is ascigerous or not, the fungus is clearly not closely related to *Nitschkia*.

11. *NITSCHKIA RECEDENS* (Niessl) Berl. Ic. Fung. 3: 22. pl. 27,
fig. 2. 1900

Calosphaeria recedens Niessl in Thüm. Contr. Fl. Myc. Lusit. 25,
26. 1881.

Von Höhnelt (36) states that *Calosphaeria recedens* Niessl is from the description clearly a species of *Romellia* Berl. and not as treated by Berlese (5) a *Nitschkia*.

Authentic material distributed by de Thümen¹⁰ has been examined by the writer and compared with authentic material of *Calosphaeria vibratilis* (Fries) Nitschke, type species of the genus *Romellia* Berl. The asci and spores in the two species are similar, several asci being borne on a branching "ascophore" as figured by Berlese. The perithecia of *C. recedens* are much smaller than those of *C. vibratilis*, and lack the peculiar flattened tip found in the latter species. No cupulate individuals have been observed in either case.

Calosphaeria recedens is not closely related to *Nitschkia*. The perithecia are small (200-250 μ), globose, crowded to scattered, buried in the inner bark and remaining covered for a long time, finally erumpent and protruding, provided with a prominent papilliform to short-beaked ostium and not collapsing.

⁹ Rav. Fungi Am. Exsic. 344.

¹⁰ Thüm. Myc. Univ. 1784.

12. COELOSPHAERIA ROSEOSPORA Pat. Tab. Fung. 7: 74. 1889

Nitschkia roseospora Kuntze, Rev. Gen. 3²: 501. 1898.

Berlese (5) states that this species belongs to *Bizzozzeria* Sacc. Von Höhnel (36) says that it is merely the young condition of *B. sorbina* (Nyl.) v. Höhn. The writer has attempted to obtain a portion of the original collection for examination, but without success. Patouillard has written that the entire specimen was sent to Berlese for use in the preparation of *Icones Fungorum*. It has not been possible to obtain it from the herbarium of Berlese, and no other material bearing this name has been seen. The figures given by Patouillard are, however, sufficient to show that the fungus is not closely related to *Nitschkia*. The filamentous paraphyses, the rosy spores, and the white matted mycelium show it to be very different.

13. NITSCHKIA SUBCONNATA (B. & C.) Kuntze, Rev. Gen. 3²: 501. 1898

Sphaeria subconnata B. & C. Grevillea 4: 141. 1876.

Gibbera moricarpa Cooke, Grevillea 7: 51. 1878.

Coelosphaeria subconnata Sacc. Syll. Fung. 1: 93. 1882.

Fracchiæa subconnata Berl. Ic. Fung. 3: 24, 25. pl. 31, fig. 2. 1900.

Berkeley (3) in his description of *Sphaeria subconnata* B. & C. states that the asci are "stuffed with the minute sausage-shaped sporidia." Berlese (5) examined the type specimen, compared it with the original collection of *Gibbera moricarpa* Cooke, found the two to be identical, and includes the species in the genus *Fracchiæa*. His figure drawn from the type of Berkeley shows a polysporous ascus. Saccardo was clearly in error in including the species in *Coelosphaeria*.

Sphaeria subconnata Schw. (74) is an entirely different species. A portion of the type collection in the Curtis herbarium has been examined, and it agrees with the description of Schweinitz. The fruit-bodies are black, occur in elongated areas rupturing the bark by a long, narrow slit, and becoming erumpent. They are probably pycnidia. They contain small, unicellular, hyaline, oval spores. The material was collected on the stems of cotton, while the

original collection of the species of Berkeley and Curtis was made on liquidambar.

(To be concluded in the March number)

EXPLANATION OF PLATES

The drawings were made by the writer with the aid of a camera lucida, and reduced one fourth in reproduction. The magnifications given refer to the figures as reproduced. Leitz apochromatic objectives and compensating oculars were used.

PLATE 1

- Fig. 1. *Nitschkia cupularis*. An ascus with mature spores. $\times 960$.
 Fig. 2. *N. cupularis*. A group of ascospores. $\times 960$.
 Fig. 3. *N. fuckelii*. A group of ascospores. $\times 960$.
 Fig. 4. *N. floridana*. A group of ascospores. $\times 960$.
 Fig. 5. *Cyathisphaeria collapsa*. A group of ascospores. $\times 960$.
 Fig. 6. *C. tristis*. An ascus. $\times 960$.
 Fig. 7. *C. pezizoidea*. A group of spores. $\times 960$.
 Fig. 8. *C. macrospora*. An ascus with mature spores. $\times 675$.

PLATE 2

Fig. 9. *Thaxteria leptosporoides*. An ascus ($\times 685$) and several free spores ($\times 960$). The spores in the ascus are immature, hyaline, and 1-septate. the free spores represent several stages in later development, the mature spores being brown and 3-septate.

Fig. 10. *T. didyma*. A group of spores of various degrees of maturity. $\times 960$.

Fig. 11. *Acanthonitschkea argentinensis*. A group of ascospores. $\times 960$.

Fig. 12. *A. argentinensis*. A perithecial spine. $\times 480$.

Fig. 13. *A. macrobarbata*. A group of ascospores. $\times 960$.

Fig. 14. *A. macrobarbata*. A perithecial spine. $\times 480$.

Fig. 15. *A. macrobarbata*. A portion of a branching hypha from the subiculum. $\times 480$.

Fig. 16. *Tympanopsis euomphala*. Two asci with mature spores. $\times 960$.

Fig. 17. *T. uniseriata*. An ascus with mature spores. $\times 960$.

PLATE 3

Fig. 18. *Nitschkia floridana*. Perithecia of the type specimen. $\times 20$.

Fig. 19. *N. cupularis*. Perithecia. $\times 20$.

Fig. 20. *N. Fuckelii*. Eruptent groups of perithecia. $\times 20$.

Fig. 21. *Calyculosphaeria macrospora*. Perithecia of the type specimen. $\times 20$.

PLATE 4

Fig. 22. *C. collapsa*. Perithecia. $\times 20$.

Fig. 23. *C. collapsa*. Perithecia. $\times 6$.

Fig. 24. *C. pezizoidea*. Perithecia of the type specimen. $\times 20$.

Fig. 25. *C. tristis*. Perithecia. $\times 20$.

PLATE 5

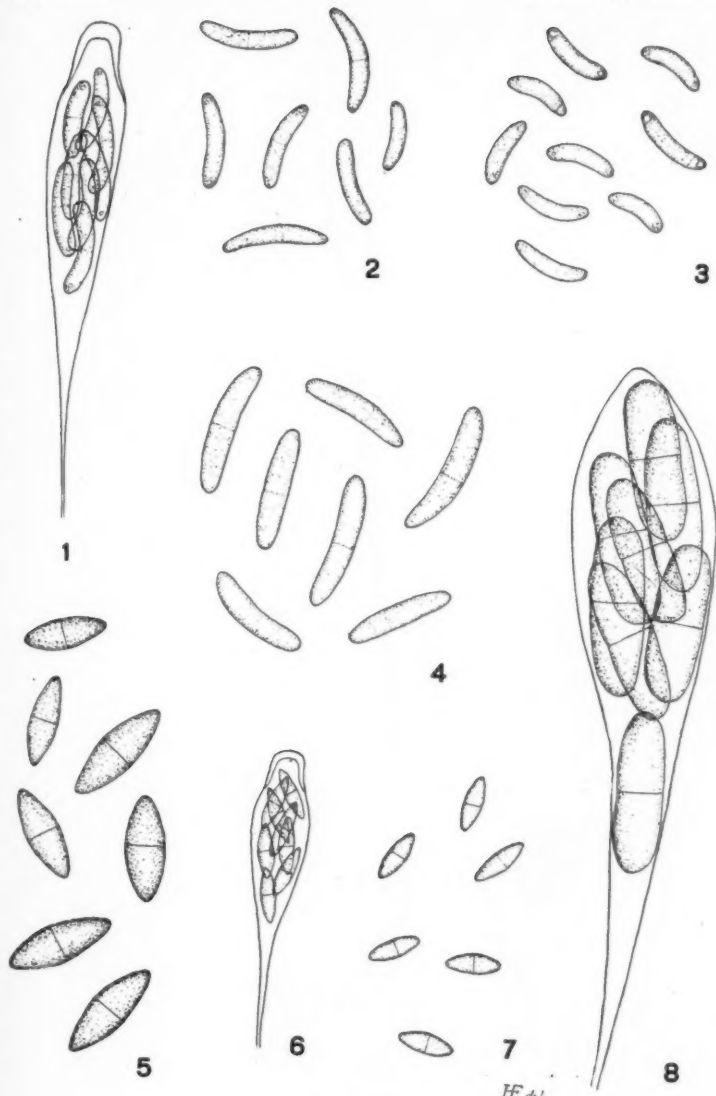
- Fig. 26. *Tympanopsis uniseriata*. Perithecia from the type specimen. $\times 20$.
Fig. 27. *T. enomphala*. Perithecia. $\times 20$.
Fig. 28. *T. uniseriata*. Perithecia. $\times 6$.
Fig. 29. *Acanthonitschkea macrobarbata*. Perithecia. $\times 6$.

PLATE 6

- Fig. 30. *Thaxteria leptosporoides*. Perithecia. $\times 6$.
Fig. 31. *T. leptosporoides*. Perithecia. $\times 20$.
Fig. 32. *T. didyma*. Perithecia from the type specimen. $\times 20$.
Fig. 33. *T. didyma*. Perithecia from the type specimen. $\times 6$.

PLATE 7

- Fig. 34. *Calyculosphaeria tristis*. Perithecia in longitudinal section. $\times 43$. The hairs of the subiculum and the bases of the perithecia were loosened from the substratum in sectioning.
Fig. 35. *Thaxteria didyma*. A perithecium in longitudinal section. $\times 43$.
Fig. 36. *Nitschkia Fuckelii*. Perithecia and stroma in longitudinal section. $\times 43$.
Fig. 37. *N. floridana*. Perithecia and stroma in longitudinal section. $\times 43$.
Fig. 38. *Calyculosphaeria macrospora*. A perithecium in longitudinal section. $\times 43$.



1-4. NITSCHKIA
5-8. CYATHISPHAERIA

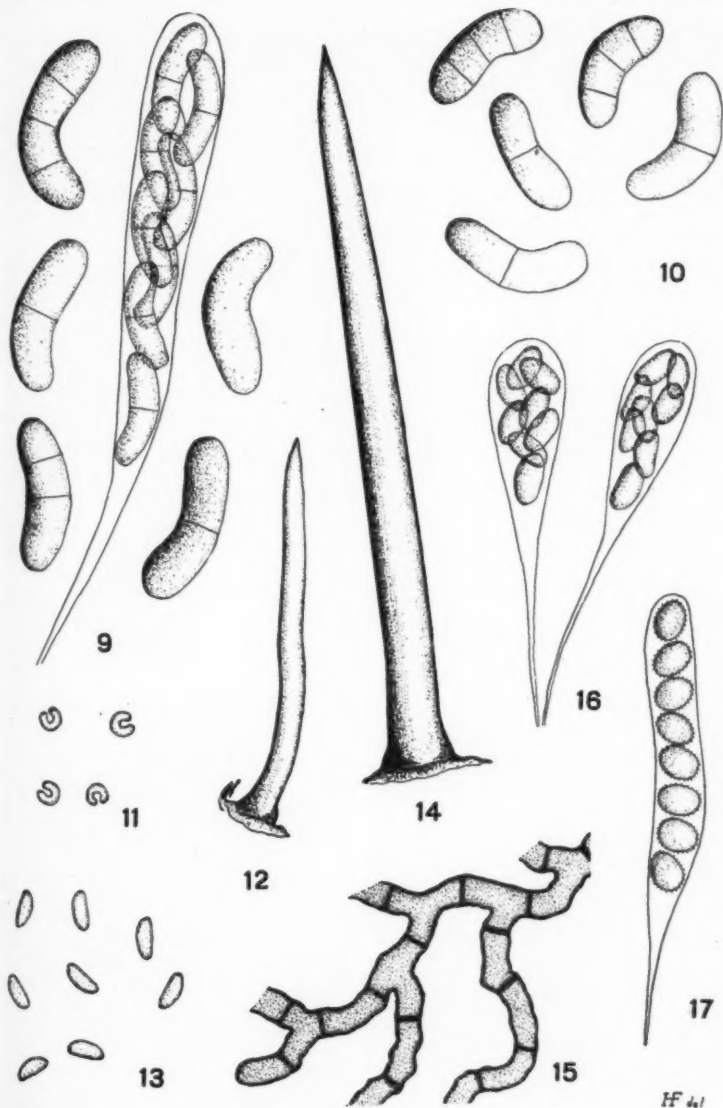
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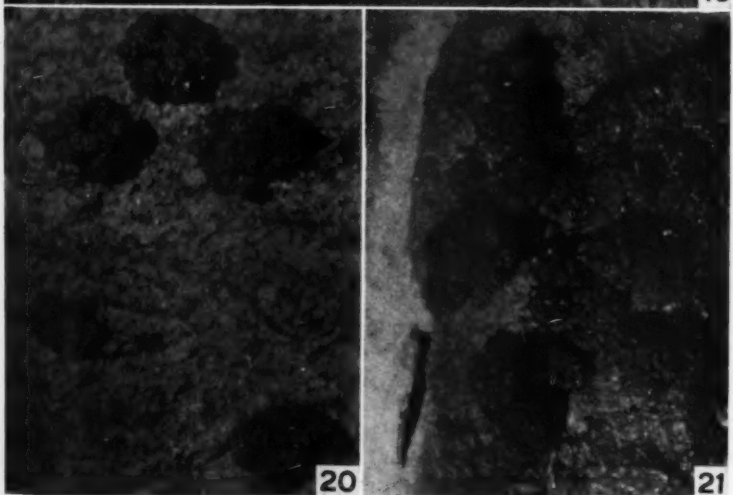
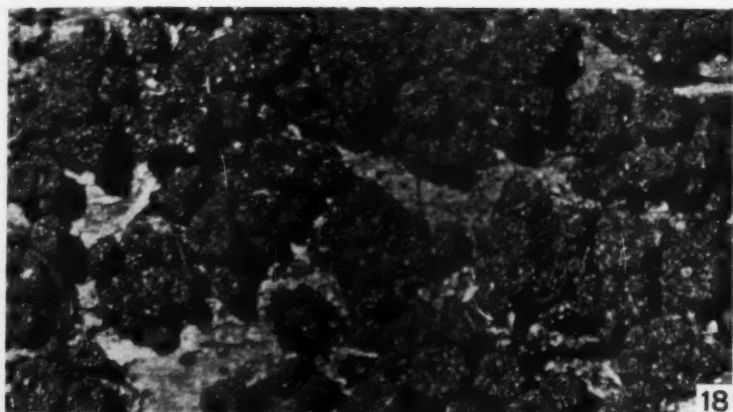
9, 10. THAXTERIA
11-15. ACANTHONITSCHKEA
16, 17. TYMPANOPSIS

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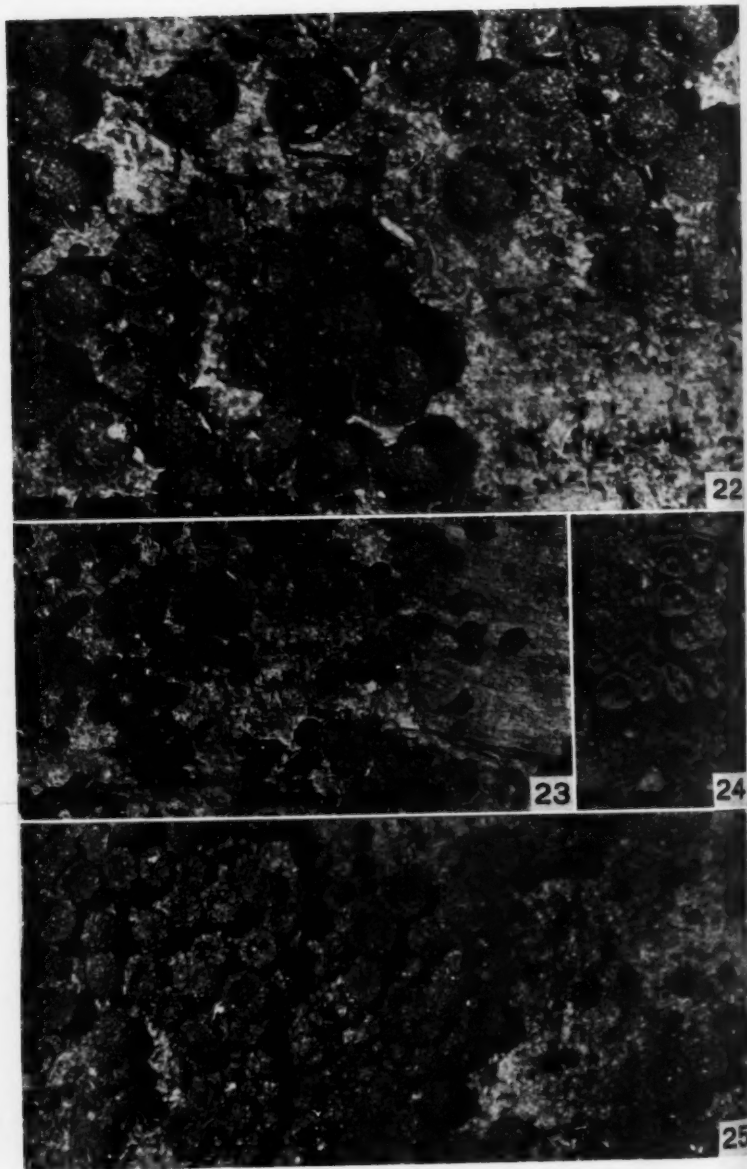
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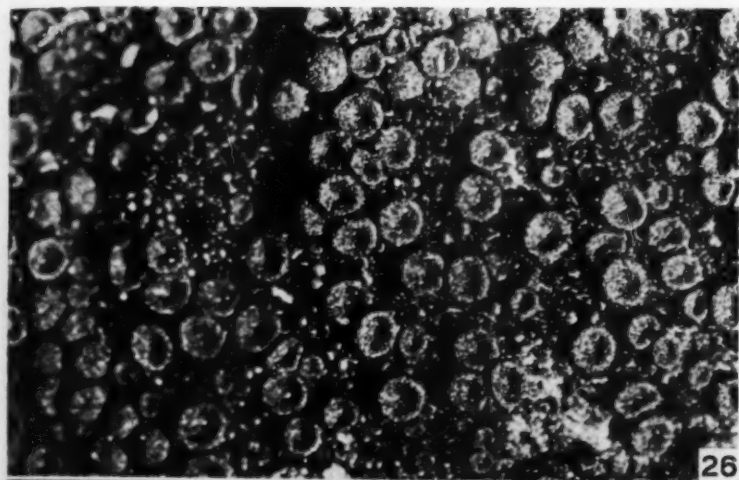


18-20. NITSCHKIA

21. CALYCULOSphaeria



22-25. CALYCULOSPHERIA



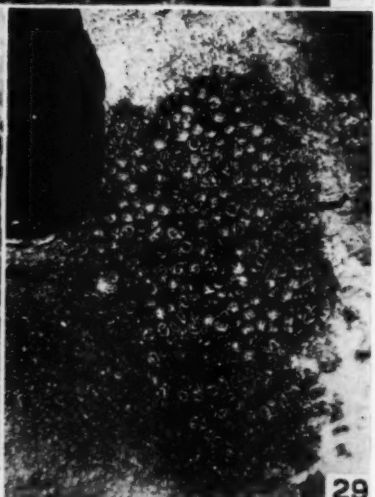
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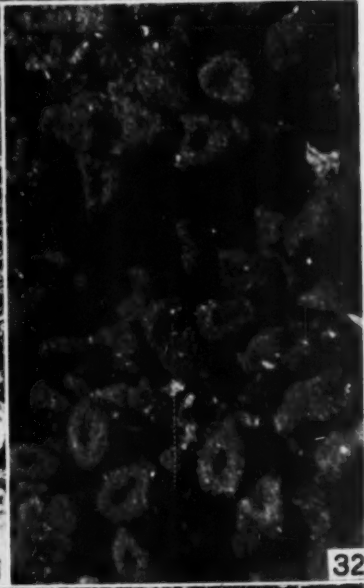
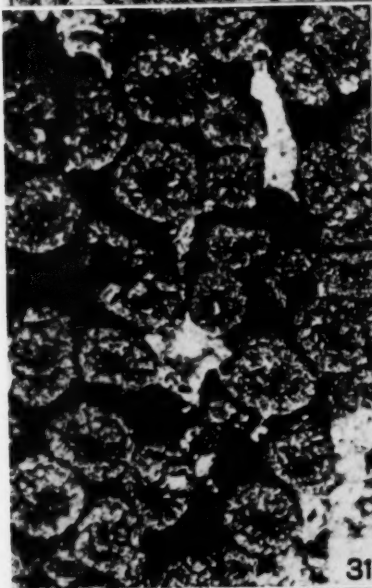
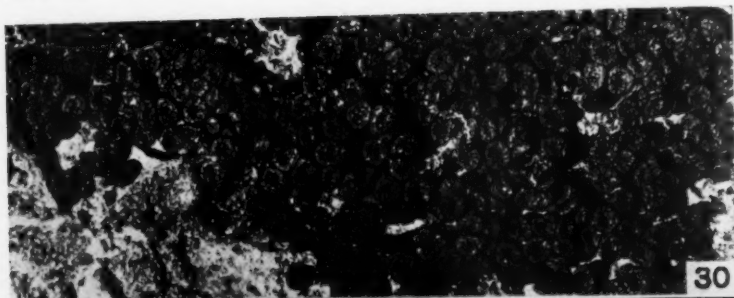
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26-28. TYMPANOPSIS

29. ACANTHONITSCHKEA

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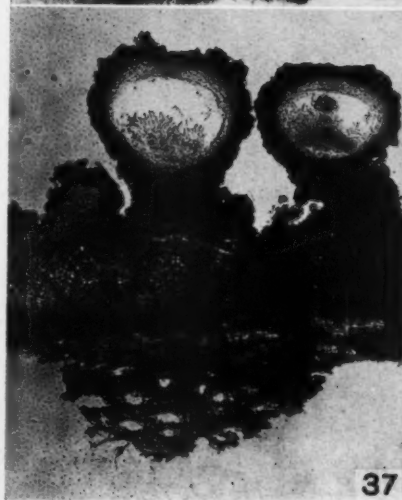




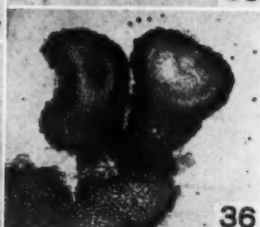
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34, 38. CALYCULOSPHAERIA
35. THAXTERIA
36, 37. NITSCHKIA



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